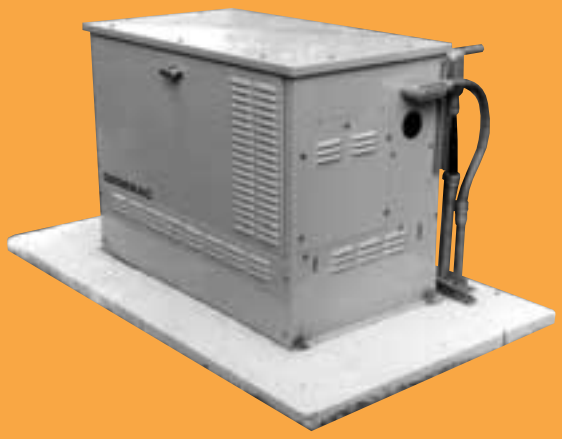
Emergency Generator Safety



Key Points of Generator Safety

- Read, understand and follow the manufacturer's instructions.
- Operate outdoors in a clean, dry area.
- Generator must be properly grounded.
- After losing power, turn off main breaker or pull main fuse block.
- Generators that are directly connected to existing wiring systems must use double-pole, double-throw (DPDT) transfer switch.
- All electrical connections must comply with the National Electric Code.
- Do not overload generator with too many appliances.
- Use properly sized extension cords in good condition.
- You may be liable for damage or injury to people and property that may result from an improperly installed or operated emergency generator.

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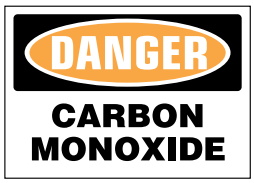


Emergency generator engines produce exhaust gases that contain carbon monoxide, a colorless, odorless and poisonous gas that can be deadly in high concentrations. Therefore, generators must be operated outdoors and away from any open windows or areas where harmful vapors may be trapped.

Operate generators only in clean, dry, well-ventilated areas. Wet or icy conditions create considerable electric shock hazards.

You may be liable for damage or injury to your neighbors and to NYSEG workers and equipment that may result from an improperly installed or operated emergency generator. You may also be responsible for any injury or damage to your property.

This brochure is for our customers who already have, or who plan to buy, an emergency generator. A brief description of generator types and modes of operation is followed by a checklist of generator safety guidelines. The brochure also includes information on sizing a generator to best meet your specific needs.

All specific questions about generators should be referred to a licensed electrician or your local building code enforcement office.

We strongly urge you to consult an electrician prior to installing or operating your generator to ensure your safety and compliance with the National Electric Code.

Overview

If you plan on using an emergency generator, it is essential that you take precautions for your safety and for the safety of NYSEG people working to restore power.

During power interruptions, properly sized and installed emergency generators can safely power electrical equipment such as portable heating units, computers, water pumps, milking machines, home freezers, refrigerators and lighting. However, emergency generators can be complicated and expensive. The key in selecting the proper generator is to evaluate what appliances you really need to power in an emergency.

To be safe, read your owner's manual carefully. Make sure you fully understand the proper installation and operating procedures for your unit — and don't forget to use common sense.

Generator Types

Available as portable or stationary units, generators come in many sizes and configurations. **However, generators must deliver power at the same voltage and frequency that NYSEG provides (120/240-volt, single-phase, 60-cycle alternating current).** Generator capacity (size) is usually stated in watts or kilowatts. Generators have one of two drive systems:

- **Engine-driven generators** are fueled by gasoline, diesel fuel, propane or natural gas. Factors such as availability, storage, volatility and safety should be considered for each fuel type. In general, smaller units (less than 7,000 watts) tend to be gasoline-powered, while the larger units usually run on diesel fuel, liquid propane or natural gas.
- **PTO-driven generators** use a power take-off (PTO) attachment on farm tractors or construction equipment such as bulldozers and front-end loaders.

Generators usually supply either 120 volts or 240 volts, although some models can supply both. Generators have manual or automatic start systems. Manual starts are typical on smaller generators, while automatic starts are common on larger installations. The two safe modes for supplying power from an emergency generator are as an **independent** portable operation or an **integrated system** operation.

Independent Generators

In this case, the generator operates as an **independent, stand-alone** unit **NOT** connected to any existing wiring system. Extension cords are plugged into the generator to deliver power to selected electrical equipment and appliances. Typical setups can range from the small, lightweight, gasoline-powered units to very large, trailer-mounted, diesel-powered generators used in mining and construction.

Extension Cord Safety Tips

Specific jobs call for specific kinds of extension cords. Since small, independent portable generators rely so heavily on extension cords to distribute power from the generator to electrical equipment, it's good to keep the following in mind:

- Always use properly sized and grounded extension cords. Check the Underwriters Laboratories (UL) label on the cord for capacity ratings.
- Only use heavy-duty, three-wire grounded cords. Cords used outdoors should be specifically rated for outdoor use.
- Always inspect cords before using them. Use only cords in good condition to avoid electrical shocks.
- Make sure cords are not a tripping hazard, especially in dimly lit doorways or halls.
- Never run cords under rugs or carpets where heat may build up or damaged cords go unnoticed.
- An extension cord that is hot to the touch is overloaded.
- Always pull on the plug — not the cord — when disconnecting it from the wall socket.

Integrated System Generators

In this mode of operation, an emergency generator is connected to an existing wiring system of a home or business using a **double-pole, double-throw (DPDT) transfer switch,** which safely isolates your generator from NYSEG power lines. ***According to the National Electric Code, this switch must be used when directly connecting an emergency generator to existing wiring.***

DPDT Transfer Switch

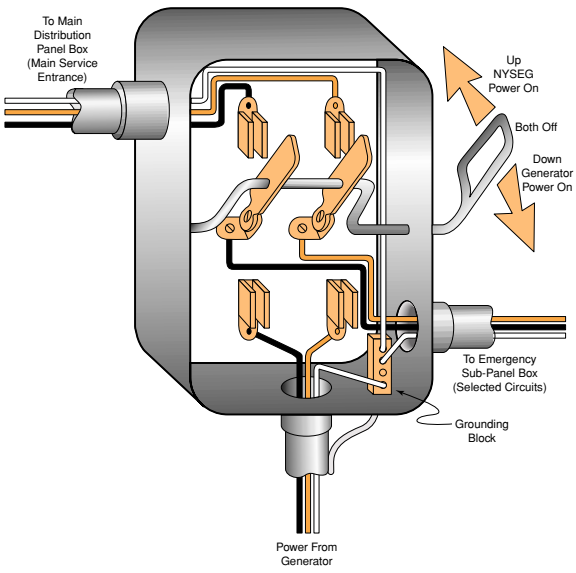
The DPDT transfer switch (Figure 1) offers protection against dangerous backfeed of electricity from your generator into our power lines, which is a serious risk to customers and to our people working to restore power. It also minimizes potential fire hazards and other serious damage. Backfeed may make a generator try to supply load beyond its capacity and thus damage both the generator and any connected equipment or appliances.

The DPDT transfer switch (Figure 1) has three positions:

- utility power on, generator power off;
- both off; and
- generator power on, utility power off.

The DPDT design guarantees utility power will be safely disconnected before your generator is switched into operation.

Figure 1. DPDT Transfer Switch



Integrated System — Permanent Generator

An integrated system must use a DPDT transfer switch. Figure 2 shows a permanent outdoor generator installation, with the unit housed inside a weather-resistant, protective enclosure. The DPDT transfer switch has been installed between the main panel box and a separate emergency sub-panel box used to redirect generator power to selected circuits. The electric devices you have determined to be necessary in an emergency are wired into the emergency sub-panel.

The location of the DPDT switch determines its required current rating (in amps). If the DPDT switch is installed on the *customer side of the NYSEG meter,* it must have a current rating which is equal to utility service (such as 200-amp service). However, if the DPDT is installed on the *customer side of the main circuit breaker or fuse panel,* then its capacity only needs to match the current rating of the generator (such as 30-amp service).

In some cases, generator installations must be **inspected** to meet the National Electric Code. Check with your local building code enforcement office regarding the need for an electrical inspection. If you cannot locate an electrical inspector, call us at 1-800-572-1111 for the names of inspectors in your area. If you've installed an integrated system but are unsure whether you have done it properly, contact a certified electrician or local building code enforcement inspector.

For permanent installations, place the generator on high ground where water cannot reach it. Allow sufficient room (3 feet minimum) on all sides of the unit for maintenance and ventilation, and place the generator in a location where air inlet and outlet openings will not be blocked by leaves, grass, snow and debris.

Integrated System — Portable Generator

An integrated system using a portable generator is shown in Figure 3. ***Here, a special heavy-duty cable from the generator is plugged into a specially designed outdoor power transfer outlet.*** (Note: this is different from a typical outdoor electrical outlet found on most homes.) This outlet feeds the DPDT transfer switch which, in turn, connects power to selected circuits in the emergency sub-panel box.

DANGER

DO NOT plug an emergency generator directly into an electrical wall outlet by using a cable made with plugs at each end. THIS IS VERY DANGEROUS! Such practice violates the National Electric Code, which clearly states that such direct connections must be made using a double-pole, double-throw (DPDT) transfer switch to prevent power being accidentally fed back into NYSEG's power lines.

Be sure that incoming NYSEG power is completely disconnected before installing or using an integrated system generator.

Emergency generators are not intended to be continuously operated for long periods of time.

CAUTION

Installing an integrated system generator is not a do-it-yourself job, as there are considerable risks of electrocution. We strongly recommend using a licensed, qualified electrician to do the installation. State and local electrical codes and ordinances must be strictly followed.

Figure 2.* Integrated System — Permanent Generator

**For illustration purposes only. We urge you to contact a qualified electrician.*

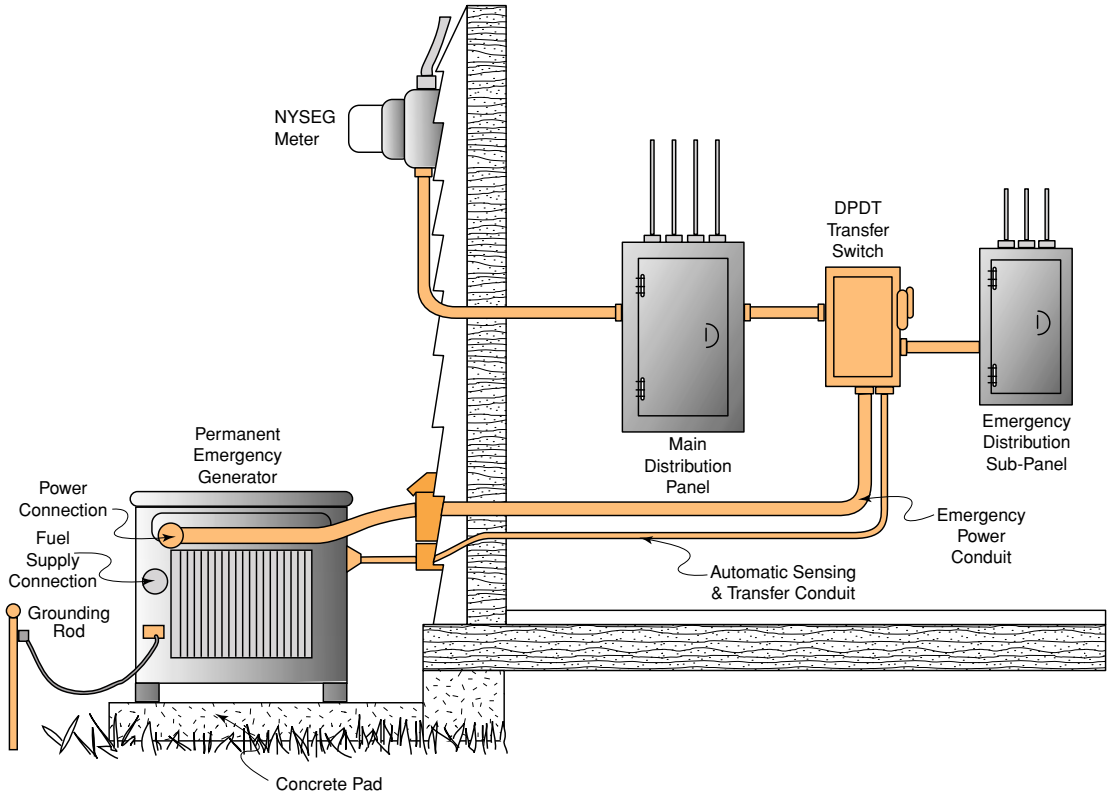
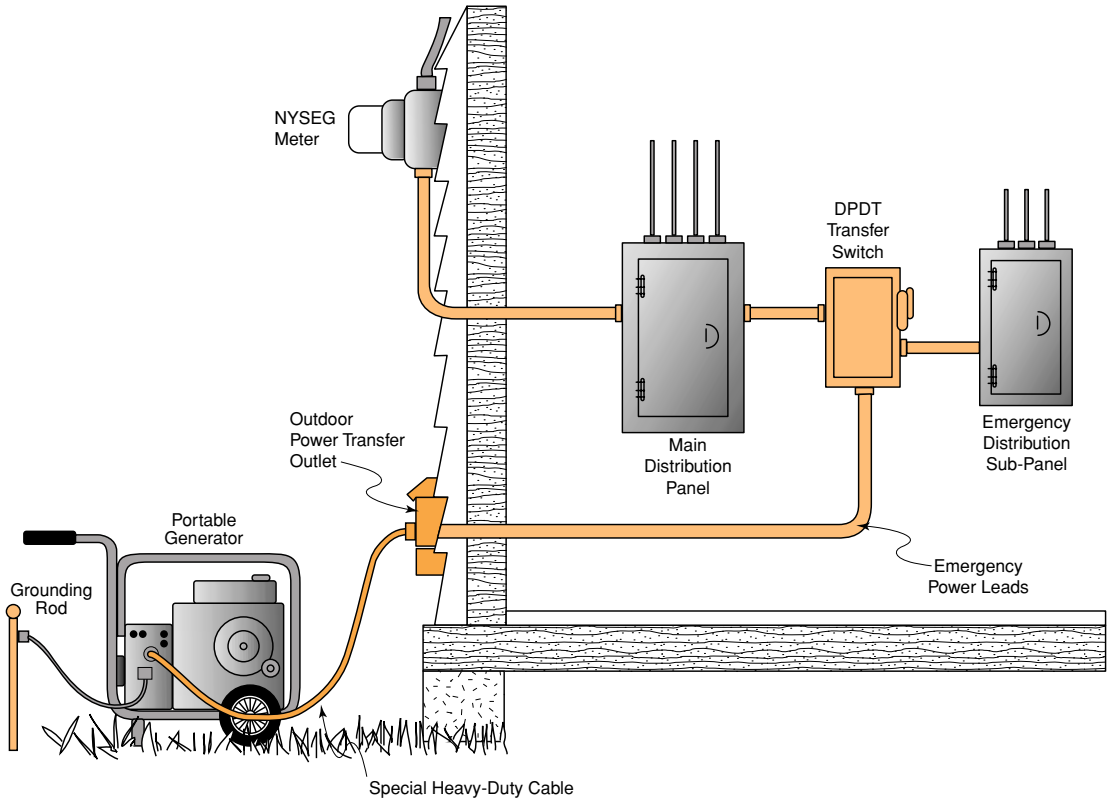


Figure 3.* Integrated System — Portable Generator Installation

**For illustration purposes only. We urge you to contact a qualified electrician.*



Integrated System — Customer-Owned Poles

Integrated system wiring for generators may also involve connection from a customer-owned utility pole. Again, a DPDT transfer switch is required and a licensed electrician **must** make the connections. In this case, the DPDT transfer switch is connected on the customer side of the meter and therefore must have current rating to match utility service. A general arrangement is shown in Figure 4.

In such an arrangement, NYSEG provides electricity service to the weatherhead (connection to house or pole) and the meter.

The customer is responsible for providing: service rack, meter socket, pressure-treated utility pole, ground wires and grounding rods, DPDT transfer switch, generator plug, conduit, electric wire, guy wires and all other associated hardware.

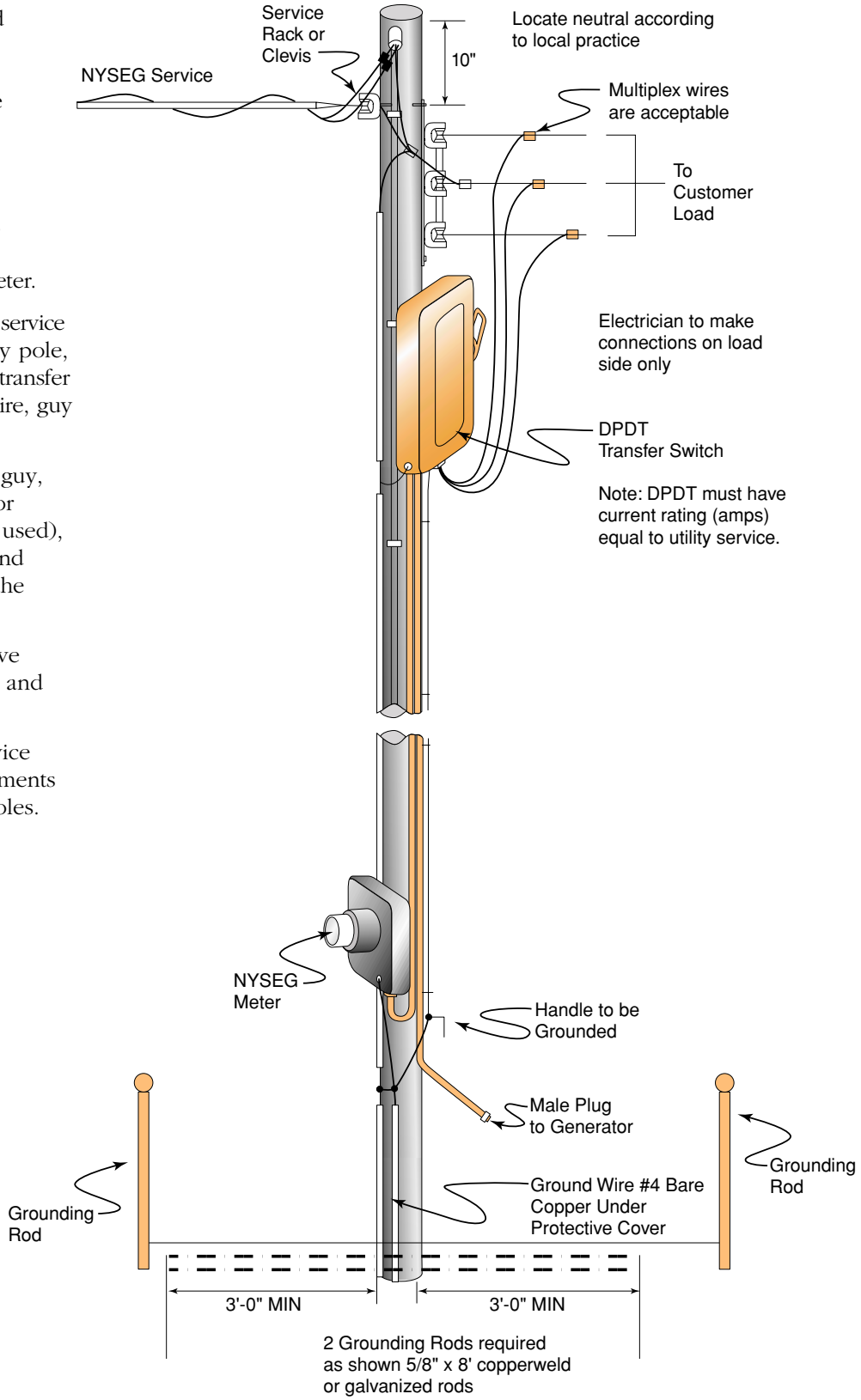
The customer also must install the pole, guy, DPDT transfer switch, the meter socket or enclosure, the conduit between them (if used), the grounds and grounding conductor, and make other connections as required on the load side only. NYSEG will install meter.

NOTE: Pole must be pressure preservative treated. For location, length, size and guying, call NYSEG.

Stop by your local NYSEG customer service office for guidelines and specific requirements on the installation of customer-owned poles. Please call us at 1-800-572-1111 if you need assistance.

Figure 4.* DPDT Transfer Switch from Customer-Owned Pole

**For illustration purposes only.*
We urge you to contact a qualified electrician.



Generator Safety Guidelines

- Before starting your generator, carefully read, understand and follow the manufacturer's instructions.
- Always operate your generator **outdoors** and away from any open windows.
- Always operate your generator in **clean, dry locations.** If operating a portable generator during bad weather, you may have to cover the unit with a tarp and poles to keep it dry. Make sure exhaust gases are safely vented away from the house or other enclosed areas.
- To prevent electrical shock, make sure your emergency generator is **properly grounded.** (Consult your owner's manual for correct grounding procedures.)
- Know the location of your circuit breaker and fuses. After a power interruption — and **before** starting your generator — turn off your main circuit breaker or pull your main fuse block.
- **NEVER** connect a generator to an existing wiring system **without using a DPDT transfer switch** to isolate utility power from generator power.
- If you have a manual DPDT transfer switch, be sure the switch is in the proper position before starting the generator.
- **Do not overload** your generator by operating too many appliances at once. Prioritize your needs. Connect your largest load, then gradually add new loads, being careful not to exceed your generator's limit.
- Certain voltage-sensitive electronic appliances (televisions, computers, stereos, for example) should not be powered by an emergency generator without using a UL-listed voltage surge protection device.
- Ground-fault circuit interrupters (GFCIs) provide protection from shocks in damp or wet locations.
- Check to make sure all connected appliances are operating properly.
- For engine-driven generators, observe safety rules when refueling your generator and when handling and storing fuel. Keep flammable fuels away from hot engines.
- Check all fuel connections. Leaking fuel and fuel vapors are potentially dangerous.
- For PTO-driven generators (see Page 2), make sure the generator is securely mounted, as there is sufficient torque from the PTO to spin the generator.
- Make sure that PTO shields are in place and that people, especially children, are kept away from this equipment because of the danger of burns, shock or entanglement.
- Turn off all equipment powered by the generator before shutting down your generator.

Sizing an Emergency Generator

Prioritize your needs before buying a generator. Make a list of all critical items you feel must operate in an emergency. Electrical appliances have resistive or inductive load. **Resistive load** appliances (electric stoves, electric space heaters, radios, light bulbs, televisions) have the same starting and operating wattages. For example, a 100-watt light bulb requires 100 watts. **Inductive load** appliances (power tools, refrigerators, freezers, pumps) use electric motors that require **two to four times** the operating wattage for start-up.

For example, an appliance with an electric motor may need one kilowatt to run, but two to four kilowatts to get started. Without sufficient starting power, motors may overheat, fail to run or burn out the generator's circuit breaker. Here are some tips on load planning:

- Use low-wattage light bulbs that provide a safe level of light. This reserves power for additional lighting, small equipment or appliances.
- Limit the load on your generator. Higher loads use more fuel.
- Add the wattages of essential appliances, including "starting wattage" for items that use electric motors.
- Nameplate information on motors or appliances can help you determine their kilowatt rating.
- Power (watts) = Current (amps) x Voltage (volts)
- Do not exceed the capacity of your generator.

The table on the back of this brochure provides typical wattages for some residential and farm equipment and includes a worksheet for planning load requirements. If you are buying a generator, this information may help you size it to fit your individual needs. We strongly urge you to consult with an electrical contractor or dealership that sells and services emergency generators. This will help ensure safe operation and compliance with the National Electric Code. The following examples use this data:

EXAMPLE 1

Customer intends to provide standby power to all the equipment necessary in an emergency situation. Major items include water well pump, hot water heater, natural gas furnace and some auxiliary heating. Based on these calculations, this customer will need a 15,000-watt generator.

Appliance/Equipment	Operating Wattage	Starting Wattage	No. of Items	Total Wattage
Light Bulbs (60-watt)	60	60	4	240
Light Bulbs (100-watt)	100	100	2	200
Water Well Pump (1/2 horsepower)	1,000	2,100	1	2,100
Hot Water Heater	4,500	4,500	1	4,500
Portable Space Heater (5,000-Btu)	1,350	1,350	1	1,350
Gas Furnace Fan (1/4 horsepower)	600	1,000	1	1,000
Heat Tape (30-foot water pipes)	240	240	1	240
Refrigerator/Freezer	700	2,200	1	2,200
Microwave Oven (625-watt)	625	800	1	800
Toaster Oven	1,500	1,500	1	1,500
Radio	75	75	1	75
Digital Clock	2	2	1	2
Total Load				**14,207**

DANGER

As a reminder, always assume that downed or broken wires are live. Stay away from them and call our electric emergency number immediately (1-800-572-1131). If a person is in contact with a live wire, do not touch or try to move that person until the line is de-energized.

EXAMPLE 2

Customer intends to purchase a 5,000-watt portable generator. Customer begins planning by first loading up the most critical equipment, working backward by adding devices to stay under the unit capacity.

Appliance/Equipment	Operating Wattage	Starting Wattage	No. of Items	Total Wattage
Light Bulbs (60-watt)	60	60	4	240
Light Bulbs (100-watt)	100	100	2	200
Portable Space Heater (5,000-Btu)	1,350	1,350	1	1,350
Refrigerator/Freezer	700	2,200	1	2,200
Microwave Oven (625-watt)	625	800	1	800
Radio	75	75	1	75
Digital Clock	2	2	1	2
Total Load				**4,867**

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Typical Electrical Appliance Wattages

For Selected Home and Farm Equipment				Determine Your Own Electrical Needs	
Electrical Appliance or Load Device	*Operating Wattage*	*Starting Factor*	*Typical Device Wattage*	*No. of Connected Devices*	*Total Wattage Needed*
Home Comfort & Security					
Light Bulb (60-watt)	60	1.0	60		
Light Bulb (100-watt)	100	1.0	100		
Flood Lamp (Halide, 400-watt)	400	1.0	400		
Water Well Pump (1/2 horsepower)	1,000	2.1	2,100		
Submersible Sump Pump (1/2 horsepower)	1,050	2.0	2,150		
Hot Water Heater	4,500	1.0	4,500		
Portable Space Heater (5,000-Btu)	1,350	1.0	1,350		
Central Air Conditioner (24,000-Btu)	3,800	1.3	4,950		
Gas/Fuel Furnace Fan (1/4 horsepower)	600	1.7	1,000		
Garage Door Opener (1/4 horsepower)	750	2.5	3,000		
Heat Tape (30-foot water pipes)	240	1.0	240		
Food Storage & Preparation					
Refrigerator/Freezer	700	3.1	2,200		
Electric Range & Oven	10,000	1.0	10,000		
Microwave Oven (625-watt)	625	1.3	800		
Hot Plate	1,500	1.0	1,500		
Toaster Oven	1,500	1.0	1,500		
Electric Fry Pan	1,300	1.0	1,300		
Slow Cooker/Crock Pot	200	1.0	200		
Coffee Maker (drip)	1,100	1.0	1,100		
Personal Care & Convenience					
Washing Machine (without hot water)	1,150	2.0	2,300		
Clothes Dryer (electric)	5,000	2.4	12,000		
Dishwasher (cool dry)	700	2.0	1,400		
Vacuum Cleaner (standard)	800	1.0	800		
Electric Blanket	400	1.0	400		
Communications & Recreation					
Personal Computer with Monitor	200	1.0	200		
Television (color)	300	1.0	300		
Videocassette Recorder/Player	30	1.0	30		
Stereo (tuner, CD, tape, speakers)	100	1.0	100		
Radio	75	1.0	75		
Digital Clock	2	1.0	2		
Power Tools					
Circular Saw (7 1/4-inch)	1,400	1.6	2,300		
Reciprocating Saw	750	1.9	1,400		
Table Saws (10-inch)	1,800	2.5	4,500		
Hand Drill (3/8-inch)	400	1.0	400		
Air Compressor (1 horsepower)	1,500	3.0	4,500		
DC Battery Charger (12-volt)	100	1.0	100		
Farm & Dairy Equipment					
Milking Machine	4,200	3.0	12,600		
Bulk Milk Cooler	10,500	3.0	31,500		
Barn Water Heater	9,000	3.0	27,000		
Ventilation Fans	500	3.0	1,500		
Silo Unloader	5,500	3.0	16,500		
Gutter Cleaner	2,000	3.0	6,000		
Total Wattage Needed					

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