

Power Quality Comes Home

Not long ago, electrical power quality – or PQ for short – was a concern only for a select few, such as engineers in government, business and industry. High-tech manufacturing plants, financial institutions, call centers and research laboratories increasingly have paid strict attention to power quality to ensure accurate measurements, uninterrupted production and reliable delivery of services.

Now, PQ is coming home. The responsibility of most electrical utilities ends at the meter, where electricity enters the home. In most parts of the USA, barring brownouts or lightning strikes, the customer normally can purchase reasonably clean electricity by the kilowatt-hour from their local electric utility.

What happens inside the home is another matter.

Unfortunately, many homes are old. The wiring may have been installed long before digital systems were even envisioned, not to mention affordable or commonplace. According to the Copper Development Association, electrical power quality can be compromised within a home in several ways, including lightning strikes, inadequate wiring, poor grounding and transient voltages due to motors or printers.

Lightning strikes are potentially the most damaging and the most difficult to protect against. A lightning protection system includes lightning rods, conductors, low-resistance grounding electrodes and several stages of surge protection. Anyone living in a lightning-prone area should consider investing in a complete system; for others, a good-quality surge protection system should suffice. A good source for information on lightning protection is the Lightning Protection Institute (www.lightning.org).

Inadequate wiring in the home can cause excessive voltage drops. Often, not enough branch circuits run back to the electric panel, or the wire gauge is too small. Large appliances may share the same circuit as sensitive loads. When a large appliance such as a refrigerator, air conditioner or laser printer is turned on in one location, then the voltage may dip someplace else, causing a computer to crash, for example.

The remedy is to run more branch circuits and/or use fatter wires (a lower AWG number; e.g., using AWG 12 instead of AWG 14), especially for long-distance runs. A new high-end “tech home” may have 30 or more branch circuits compared with four or five branches for a 1950s vintage dwelling. The right number of branch circuits to ensure good PQ lies somewhere in between.

Transient voltage surge suppressors (TVSSs), also known as surge protection devices (SPDs), can be installed to filter out “transients,” which are short-term deviations from normal voltage levels. Many kinds are available at many price points. SPDs can be used effectively throughout the home and, in some cases, three layers of surge protection can be beneficial. For example, one SPD can be installed for the whole house at the main breaker panel, one for each of the branch circuits and one at each outlet serving electronic equipment.

Inadequate grounding can also cause performance problems. All ground wires (third wires) must be ultimately connected to the earth through a low-resistance conductor. A “floating” ground, that is, an unconnected ground, can cause electronic equipment to malfunction.

The importance of proper grounding should not be overlooked. SPDs will not function properly unless correctly grounded. Furthermore, many people do not realize that communications wiring systems also must be grounded, including phone lines, coaxial cables, structured wiring, television antennae and satellite dishes. Electrical wiring and communications wiring should be connected to the same grounding system.

“Good power quality begins with good wiring in the home,” says David Brender, national program manager for the Copper Development Association. “Older homes often lack the infrastructure necessary for optimal performance of today’s electronics.”

Call a local electrician to get a checkup for your home electrical wiring. Meanwhile, for more information about residential electrical wiring, visit www.copper.org/buildingwire. **HP**