



W H I T E P A P E R



UL 60601-1 Power Strips with Fault Protection:

The Only Safe Choice for Standalone Use in Patient Care Vicinities

Executive Summary

Understanding the risks associated with healthcare equipment in hospitals, clinics and other healthcare facilities is paramount to avoiding safety citations, fines and even injuries to patients and staff. Because of the electrical hazards present in these environments, it is absolutely necessary to use code-compliant power strips in patient care vicinities to minimize the risk of potentially harmful shocks.

UL 60601-1 power strips with fault protection are uniquely suited for standalone use in patient care vicinities, but misleading marketing and labeling makes it difficult to distinguish true UL 60601-1 power strips with fault protection from ordinary power strips without fault protection that are not code compliant for standalone use in patient care vicinities. This white paper discusses how to select the safest power strip for your application, ensuring safety and code compliance in your facility.



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Minimizing Risk

A fundamental goal in healthcare environments is the avoidance of preventable harm. This is especially important for patients because they are often in vulnerable conditions and situations. An event that might not affect a healthy person can become a serious hazard in a healthcare setting when a patient's condition prevents a response. Even healthy patients are at greater risk when required to be in direct contact with electrical devices. If the device or wall outlet experiences a fault, the patient's body becomes the likely path of least resistance to complete the circuit, with possible injury or even death as a result. Essential protection from electrical shocks is the basis for the patient care standards defined in NEC (National Electrical Code) Article 517, NFPA (National Fire Protection Association) 99 and NFPA 101.



Protecting Against Electrical Faults

In a hospital or medical center, protection against an electrical fault condition (wherein the ground or neutral line is no longer providing ground or is defective) is vital to patient and staff safety. An unintended fault could occur if an electrician fails to make a proper ground connection somewhere in the circuit, a wire becomes damaged or a device is defective.

The NEC mandates fault protection in the design and construction of the building wiring.¹ The NEC requires not only a "green" ground conductor wire at each wall outlet for connection to medical devices, but also a redundant ground-fault path at the same location provided through a metal channel/conduit or raceway. The redundant ground maintains continuity of protection in the event of an electrical fault. If this safety measure did not exist, an open ground could allow leakage current or stray current to harm the patient.



Medical devices are held to higher safety standards than virtually any other types of equipment, with the highest standards defined by the NEC for use within the *patient care vicinity*. The patient care vicinity is a space that extends horizontally 6 feet beyond the patient bed, chair, table or other device that supports the patient during examination and treatment and extends vertically to 7 feet 6 inches above the patient.² Any electrical device that may be used in any patient care vicinity requires special features to help prevent shocks in the event of a single fault condition. Certification that the electrical device meets these requirements falls under the purview of the UL 60601-1 safety standard.

When a medical device certified to meet UL 60601-1 is connected to a wall outlet in a healthcare environment, it must provide continuity of protection. To accomplish this, the device must incorporate one or more redundant *means of protection* to isolate patients and operators from the risks of shocks in the event of a single fault condition. This can be insulation, a protective earth ground, a defined creepage distance, an air gap or some other shock impedance.³

Using Power Strips in Healthcare

As technology use continues to grow in healthcare, additional outlets are often required. A power strip seems like a simple solution, but ordinary power strips like those commonly found in homes and offices cannot be used in patient care vicinities.

Power strips (*relocatable power taps*, by definition) are corded devices with multiple outlets and three conductors – hot, neutral and ground – within the power cord. No provision for additional means of protection is required for a power strip certified to the “ordinary” UL 1363 standard, so it cannot be used in patient care vicinities. (Even if it has a hospital-grade plug and outlets, those don’t qualify as additional means of protection.) There are two types of power strips that can be used in patient care vicinities:

1. UL 1363A power strips, which are ordinary power strips approved as components of medical systems. They can only be used in patient care vicinities under specific, narrowly defined circumstances.
2. UL 60601-1 power strips with fault protection, which are code compliant for standalone use in patient care vicinities. (“Standalone” means the power strip does not need to be part of a medical system.)

Using UL 1363A Power Strips

UL 1363A (defined by UL as an “Outline of Investigation” rather than a “Standard”) describes requirements for *special purpose relocatable power taps* to be used as permanently mounted components of movable medical systems such as IV poles, mobile carts and other mobile medical equipment. A UL 1363A power strip can be used inside patient care vicinities, but only as a non-removable part of the larger medical system, such that the qualified technician responsible for its configuration can ensure its safety in use.⁴ **UL 1363A power strips are not code compliant for standalone use inside patient care vicinities.**

Using UL 60601-1 Power Strips with Fault Protection

As discussed previously, UL 60601-1 defines requirements for electrical devices to be used inside patient care vicinities. These devices must include special provisions for protecting patients and staff in the event of a single electrical fault. Because they include these special provisions, UL 60601-1 power strips with fault protection meet code requirements for standalone use inside patient care vicinities. They do not need to be used as part of a larger medical system.

Tripp Lite’s UL 60601-1 power strips with fault protection stand in stark contrast to ordinary UL 1363 or 1363A power strips because of the advanced circuitry they incorporate to protect patients and staff against single electrical faults. Tripp Lite’s “ULTRA” series of UL 60601-1 power strips and surge protectors with fault protection include patented technology (U.S. Patents 7,375,939 and 8,339,759) that constantly monitors all three electrical lines (hot, neutral and ground) and instantly interrupts power to the outlets if any one of them is compromised.

That patented fault protection allows the ULTRA power strips to provide the required continuity of protection from the wall outlets in healthcare facilities required by UL 60601-1. Many regulators consider them to be even safer than the wall outlets because they actively monitor and confirm the integrity of that protection. That’s one reason the PS-415-HGULTRA power strip is allowed in Chicago hospitals by the City of Chicago’s demanding Department of Buildings.

Diagnosing Marketplace Confusion

It should be fairly simple to select a power strip that meets code requirements for patient care vicinities: choose a UL 1363A power strip if it will be a component of a larger medical system and choose a UL 60601-1 power strip if it will be used as a standalone power strip. Unfortunately, the marketplace has deliberately blurred the distinction between ordinary UL 1363A power strips and UL 60601-1 power strips with fault protection. Because UL 1363A includes references to portions of the UL 60601-1 standard, some UL 1363A power strips have been labeled and sold as if they are independently certified to the full UL 60601-1 standard and safe for standalone use. This is not only erroneous and misleading, it is also dangerous to patients, staff and the good standing of any healthcare organization that doesn't learn to tell the difference.

TÜV Rheinland North America, one of OSHA's nationally recognized testing laboratories, says this about UL 1363A strips:

Special (medical) purpose relocatable power taps (SPRPTs) being certified for the United States (TUV USA) must be tested and certified according to UL 1363 and UL 1363A, taking into consideration the references to UL 60601-1, which is dictated by UL 1363A.

Unless otherwise specified, the following Conditions of Acceptability shall be stated in the test report:

These devices require the use of a tool for mounting and removal and are intended for mounting to carts, racks, tables, pedestals and other similar apparatus. They shall not be placed on the floor.

The SPRPT shall only be certified as a component. The certification document shall indicate the special remark "This SPRPT component shall be separately investigated when used in General Patient Care Areas or Critical Patient Care Areas as defined by Article 517 of the National Electrical Code for Health Care Facilities."⁵

TÜV underscores two very important things related to the use of UL 1363A power strips:

1. UL 1363A power strips must be used as defined by the UL 1363A requirements. Regardless of whether UL 1363A references portions of the UL 60601-1 standard, **power strips certified to UL 1363A cannot be used as if they were independently certified to the UL 60601-1 standard.**
2. Power strips certified to UL 1363A must be mounted and used as a component of a larger medical system such that the qualified person responsible for the configuration can ensure the safety of the combined system in use. **A UL 1363A power strip cannot be used outside that medical system as a standalone power strip.**

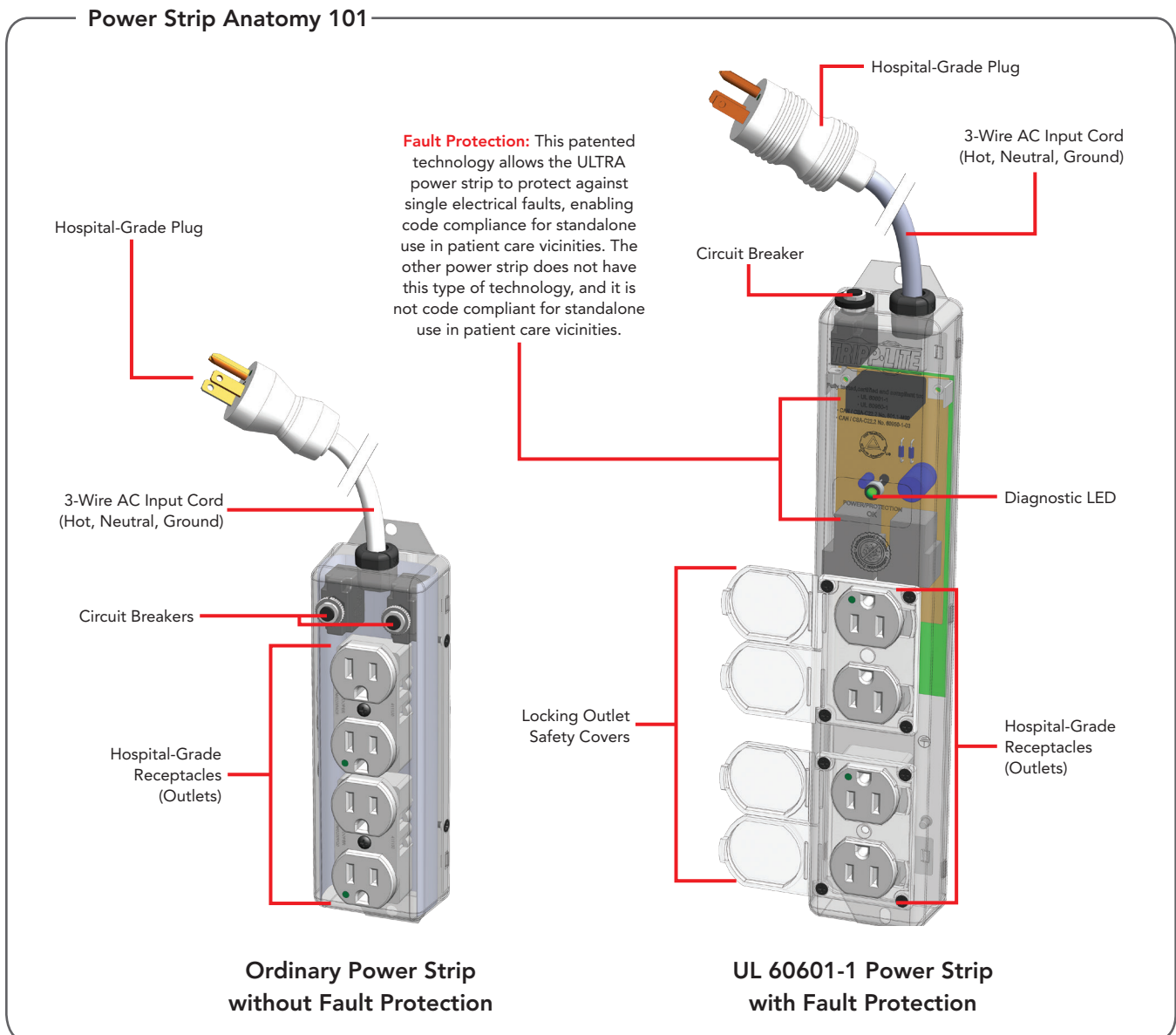
(Such usage should require the strip to be separately Listed to UL 60601-1 instead of approved as a component through UL 1363A, though many of these strips are also erroneously marketed as Listed to UL 60601-1.)

Recognizing UL 60601-1 Power Strips with Fault Protection

Misleading marketing makes it impossible to rely on labels alone. You must be able to tell the difference between a true UL 60601-1 Listed power strip – which includes fault protection – and an ordinary power strip that has been mislabeled.

The ordinary UL 1363A power strip below on the left is often misleadingly labeled as a UL 1363A / UL 60601-1 power strip. It can be used as a permanently attached component of a larger medical system, as long as the “electrical and mechanical integrity” of the system is “regularly verified and documented through an ongoing maintenance program.”⁴ However, it is neither code compliant nor safe for standalone use in patient care vicinities because it lacks fault protection.

The ULTRA power strip below on the right includes proprietary and patented technology that protects against single electrical faults. That patented technology allows it to be Listed to the full UL 60601-1 standard and makes it fully code compliant for standalone use inside patient care vicinities.



Testing for Code Compliance



PS-415-HGULTRA and PS-406-HGULTRA
UL 60601-1 Power Strips with Fault Protection



SPS415HGULTRA and SPS406HGULTRA
UL 60601-1 Surge Protectors with Fault Protection

Some UL 1363A power strips are marketed erroneously as UL 1363A / UL 60601-1 power strips, but they do not protect against single faults, are not certified for use as **standalone** power strips and, most importantly, do not provide adequate protection for patients and staff. Since you can't rely on labeling, the safety and code compliance of your facility depends on your due diligence. As you research power strip options, ask the manufacturer these very important questions:

- **Has the power strip been separately and independently investigated and Listed to UL 60601-1 standards?**

UL 1363A power strips are often marketed with misleading references to UL 60601-1, but those strips are not independently certified to the full UL 60601-1 standard. Sometimes they're even misleadingly labeled as Listed to UL 60601-1. If UL 1363 or UL 1363A is mentioned in the specifications of the power strip, that's your first clue that the power strip is not code compliant for **standalone** use in patient care vicinities.

- **How does the power strip protect against a single fault condition when used as a standalone device?**

If a power strip doesn't have fault protection, it simply cannot be safe or code compliant for standalone use in patient care vicinities, regardless of labeling. Only Tripp Lite ULTRA power strips and surge protectors include Tripp Lite's proprietary, patented fault-protection technology. They are the only UL 60601-1 Listed strips currently on the market that protect against single electrical faults and meet the NEC Article 517 requirements for use as standalone power strips in patient care vicinities.

If the power strip manufacturer cannot answer the questions above clearly and directly to your satisfaction, you won't be able to answer them during an inspection. The manufacturer should also be willing to put this statement in writing:

This power strip has been independently investigated and Listed to UL 60601-1. It protects against single electrical fault conditions, it is not required to be used as a permanently attached component of a larger medical system and it is code compliant for standalone use in patient care vicinities.

If they won't put it in writing, seek an alternative to protect the safety of your patients and the good standing of your organization.

Conclusion

If you need to use power strips for standalone applications within patient care vicinities, be absolutely certain those power strips are UL 60601-1 Listed devices that **provide fault protection**. Because of the confusion and misleading labeling in the marketplace, you must take extra steps to ensure your facility's safety and code compliance. Ask the power strip manufacturer the questions outlined in this white paper. If their answers aren't adequate, their power strips aren't adequate to protect your patients and your facility.

Ready to learn more?

Contact Tripp Lite's Healthcare Power Specialists: 773.869.1282 • medical@tripplite.com.

About Tripp Lite

Customers in the IT, telecom, industrial, commercial, corporate, healthcare, government and education sectors choose Tripp Lite for complete solutions to power, protect, connect and manage servers, network hardware and other equipment in data centers and related facilities. Tripp Lite makes more than 3,500 products, including UPS systems, battery packs, PDUs, rack enclosures, cooling solutions, surge protectors, KVM switches, cables, power strips, charging carts and inverters. For more information about Tripp Lite's full line of healthcare solutions, visit www.tripplite.com/medical.



References

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