



FESHCom
Electrical Safety Subcommittee

ESS Determination D2014-1 14-Mar-2014
Supersedes ESS Determination D2012-1 25-Apr-2012

Acceptable Uses of Multiple Outlet Strips

Multiple Outlet Strips, also known as Relocatable Power Taps (RPTs) were originally designed for connecting computers and their multiple accessories, all relatively low power. The most common type has six outlets, an on/off switch, and an internal circuit breaker that is designed to trip at either 15 or 20 amps.

RPTs must be plugged directly into wall receptacles, and may be temporarily mounted such that a tool is not required for removal.¹ RPTs must be a UL (or other NRTL) approved device. These devices are not meant to be a replacement or extension of premises wiring.

Safety walkthroughs at Fermilab frequently identify RPTs that are used to power appliances such as refrigerators, microwave ovens, toasters, and coffee makers from wall outlets that are too distant or scarce. The latest OSHA interpretation on the topic, dated November 2002, states that these devices “are not designed for high powered loads such as space heaters, refrigerators and microwave ovens, which can easily exceed the recommended ampere ratings on many power strips.” (Attachment 1), OSHA Standard Interpretation 24631). In February 2009, the DOE Office of Health, Safety, and Security (the DOE Policy and Enforcement Entity) provided additional RPT guidance (Attachment 2) that clarifies the application of the OSHA interpretation and specifies that coffee makers and toasters are also examples of high-power devices.

Fermilab’s FESHM Chapter 5040 Part 6.1 states that “Maximum load on a multiple outlet strip shall not exceed that indicated by the rating label on the strip.” If two high-power loads are connected to a power strip it is likely that the RPT’s rating has been exceeded. If three or more high-power loads are connected to an RPT, then its rating has certainly been violated. In any case the remaining RPT receptacles are rendered unusable by the presence of a single high-power load.

The ESS has determined that RPT’s will be restricted in use to only a number of low powered loads, such as computers, peripherals, audio/video devices or laboratory test equipment. High power loads such as space heaters and kitchen-type appliances shall be directly plugged into a wall receptacle or through a single appliance extension cord as permitted by ESS Determination D2010-2. Exceptions are subject to the approval of the Authority Having Jurisdiction (AHJ).

Attachment 3 lists item numbers for RPTs and appliance cords carried by the stockroom.

¹ UL 1363, Listing for Relocatable Power Taps, Section 7: “Temporary Mounting Means”

November 18, 2002

OSHA Standard Interpretation 24631

Wade R. Abnett, ASP
Senior Safety Engineer
Middle River Aircraft Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Dear Mr. Abnett:

Thank you for your October 22, 2001 letter to the Occupational Safety and Health Administration (OSHA). This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any questions not delineated within your original correspondence. You had concerns regarding an OSHA interpretation letter, "*The use of power strips*" addressed to Mr. Rick Cee, Chairperson, OSHA, Salt Lake City Technical Center, dated June 11, 1993. This letter has been removed from OSHA's website and is no longer considered current. We apologize for the delay in responding to your request.

Question: What is the current compliance status on the use of "power strips"?

Reply: "Power strips" (as they are most commonly referred to) "Surge/Spike Protectors" or "Portable Outlets," typically consist of several components, such as multiple electrical receptacles, on/off power switch, circuit breaker, and a grounded flexible power cord. One nationally recognized testing laboratory, Underwriters Laboratories (UL), refers to power strips as *Relocatable Power Taps (RPTs)* and, in its "*General Information for Electrical Equipment Directory*" (sometimes called the UL white book or UL Directory), describes RPTs as "*relocatable multiple outlet extensions of a branch circuit to supply laboratory equipment, home workshops, home movie lighting controls, musical instrumentation, and to provide outlet receptacles for computers, audio and video equipment and other equipment.*" Power strips may contain other electronic components intended to provide electrical noise filtering or surge protection. UL defines and lists such devices in UL 1283, *Standard for Electromagnetic Interference Filters* and UL 1449, *Transient Voltage Surge Suppressors (TVSS)*; TVSSs are dual-listed by UL and meet the requirements of UL 1363, *Relocatable Power Taps*.

OSHA's standard at 29 CFR §1910.303(b)(2), Installation and use, requires that "*Listed or labeled equipment shall be installed and used in accordance with any instructions included in the listing or labeling.*" Manufacturers and nationally recognized testing laboratories determine the proper uses for power strips. For example, the UL Directory contains instructions that require UL-listed RPTs to be directly connected to a permanently installed branch circuit receptacle; they are not to be series-connected to other RPTs or connected to extension cords. UL also specifies that RPTs are not intended for use at construction sites and similar locations.

Power strips are designed for use with a number of low-powered loads, such as computers, peripherals, or audio/video components. Power loads are addressed by 29 CFR §1910.304(b)(2), *Outlet devices*: "*Outlet devices shall have an ampere rating not less than the load to be served.*" Power strips are not designed for high power loads such as space heaters, refrigerators and microwave ovens, which can easily exceed the recommended ampere ratings on many power strips. They must also meet the requirements of §1910.305(g)(1), *Use of flexible cords and cables*. For example, the flexible power cord is not to be routed through walls, windows, ceilings, floors, or similar openings.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information.

To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov/>. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director
Directorate of Enforcement Programs



Safe Use of Power Strips

A power strip or more accurately, a relocatable power tap (RPT) is simply a variation of an extension cord, where the cord terminates in a row or grouping of receptacles. Power strips are commonly used in offices to provide multiple receptacles to office equipment. In general, the policies pertaining to extension cords also apply to power strips. Most are rated for 15 amps and should not be overloaded.

Good practice and OSHA interpretation letters suggests that major appliances such as microwaves, refrigerators, space heaters, coffee makers, toaster ovens and other appliances or tools with high power loads must be plugged into the wall outlet directly. Power strips are not designed for high power loads such as space heaters, refrigerators and microwave ovens, which can easily exceed the recommended ampere ratings on many power strips.

Additional requirements are:

1. Only UL (or other NRTL) approved device can be used.
2. A RPT cannot be permanently mounted to any facility surface, except as allowed in 3 below. It may hang from screws or hooks if manufactured with for that purpose with slots or keyholes.
3. In equipment racks, the preferred method of supplying 120/208-volt utility power to rack-mounted instruments is via a special power strip specifically designed to be rack-installed.

Surge Protective Device (SPD) Power Strips

Surge protection devices (SPDs) are used to protect sensitive electronic equipment such as computers, monitors, scanners and printers, from transient over-voltages. SPDs can be manufactured as corded power strip or a wall mount outlet(s) and may have protected outputs for phone, network, and coaxial cable. Both types are considered as power strips and adding additional cords or power strips would be “daisy chaining.”

All surge suppressors have a limited useful life. Metal oxide varistors (MOVs) inside the suppressor slowly degrade over time as they absorb excess energy from the power source. Most surge suppressors will continue to function as a power strip, even though the MOV may have been destroyed by a power spike. This presents two possible dangers:

1. If another power surge should occur, it can damage the equipment or appliances that are plugged into this surge protector.
2. If sufficient voltage passes through the surge protector due to a second power spike, a resistant short may have been formed, allowing heating to occur and a fire to ignite.

Surge suppression devices with lights that indicate proper operation should be inspected on a regular basis. Devices without any visual or audible indication, as well as devices manufactured before 1998 should be removed from service and disposed of.

Additional requirements are:

1. All surge protectors or power strips need to be UL approved. Be sure that the product is listed as a TRANSIENT VOLTAGE SURGE SUPPRESSOR.
2. Use only devices that have an internal circuit breaker. These units will trip the breaker if the power strip is over loaded or shorted to prevent overheating and fire.
3. If at any time the surge protector or power strip is hot to the touch remove and replace the unit. The electrical load for this strip should be evaluated for overloading.
4. Do not locate a surge protector or power strip in any area where the unit would be covered with carpet, furniture, or any

other item that will limit or prevent air circulation.

5. Do not locate a surge protector in a moist environment.
6. Minimum energy suppression rating of 1200 joules. The larger the minimum energy suppression rating, the better the protection against overheating and fire.

For examples of acceptable and unacceptable combinations of extension cords and power strips, see Figure 1 Extension Cord Use Examples. The examples have been chosen as representative of applications commonly, however acceptable and unacceptable combinations are not limited to the examples.

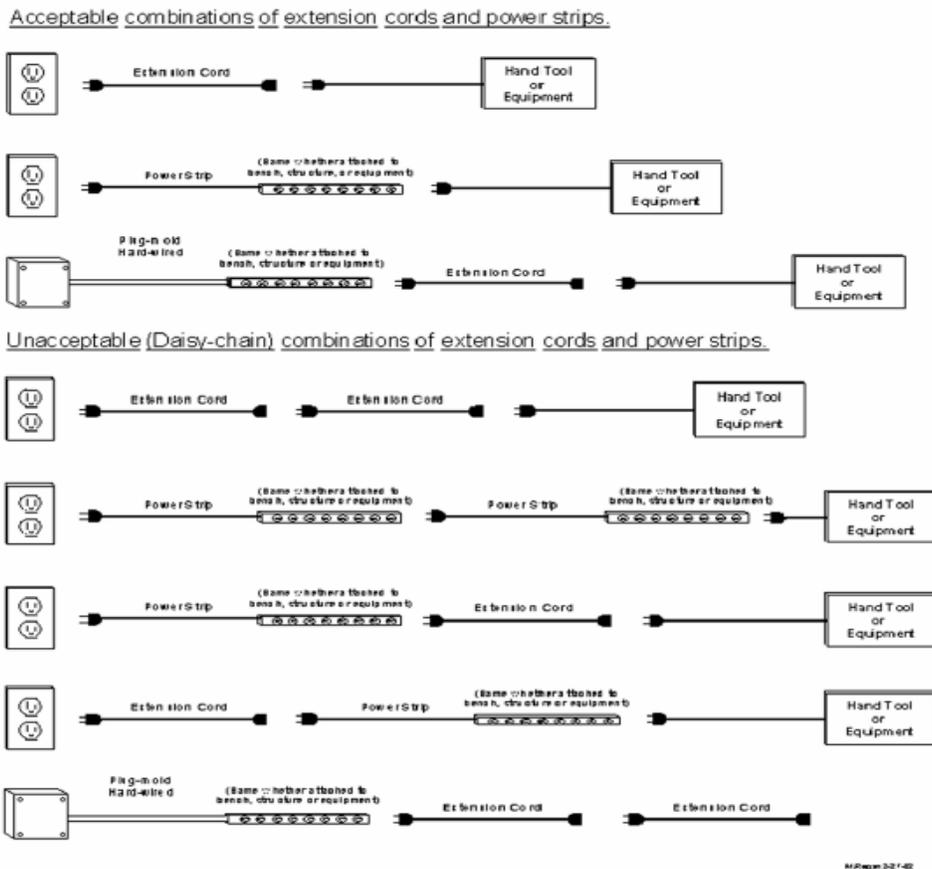


Figure 1: Examples of Extension Cord Combination Usage

Power Strips Save Energy Combat Power Draw

Almost all computers, computer peripherals (printers, modems, scanners, etc.) and home entertainment products (stereo, DVD player, televisions, etc.) draw an idle electrical current even after they have been turned off. Some devices still draw the same amount of power even when turned off. To alleviate this, the device needs to be physically unplugged from the wall. Using a power strip allows multiple devices to be plugged into one unit. Rather than having to unplug multiple devices, you only need to unplug (and plug back in) the power strip in this case making it a much easier process that you are more likely to remember.

5 Power Strips that Add Some Smarts

The lowly extension cord can do more than collect dust bunnies under a desk or entertainment center

We tend to ignore the ever present extension cord that's behind our desk—a hub for black electrical cables and dust bunnies. Not much has advanced in the years since some strips married themselves to surge protectors, aside from some added protection for cable and phone wiring.



The Powramid Power Strip

Now, smarter strips can help conserve power by warding off vampire power, send juice through a USB cable, or avoid having

to crawl under a desk. They can help tame a PC that refuses to sleep, or at least shut down all its peripherals.

Attaching some small extension cables or simply switching off a strip can get the same results, but not so elegantly or conveniently. But none will change your life, and their prices generally seem steep for what you get.

Here are five cleverly designed power strips worth looking into:

Belkin Conserve. Switching off a power strip can cut nocturnal losses to the "standby" mode of a TV or DVD player, but it's a pain to crawl among the dust bunnies behind a desk or entertainment system. The Conserve helps with a simple remote control that shuts down six of eight outlets. It works as advertised, although the remote feels cheaply made as it rocks back and forth. The strip can pay for itself in a couple of years with energy savings. Of course, you have to keep track of another remote.

Socket Sense. Individual sockets slip back and forth on a strip that stretches or contracts. The flexibility ensures that all six sockets have enough room for fat power bricks, while not taking up any more room than necessary. The plug holes themselves are turned at an angle, meaning they can stay unblocked by narrower and longer cellphone adapters.

Monster Outlets to Go 3 USB. This strip adds a port for gadgets that charge through a USB cable. That handy addition comes on a small, 6-inch strip with only three outlets and has a short cable that neatly wraps around it. It's great for use in hotel rooms. And while the strip has no switch to turn it on and off, it includes a small blue light that doesn't glow if a hotel's outlet is dead. Older Monster models pack as many as six outlets into a compact strip, but without the USB port.

The Powramid. This power center finally breaks the rectangular mold. The short pyramid shape sets the outlets at an angle to each other, accommodating fatter adapters while taking less room on the floor. The nonstrip power strip includes other basics, such as surge protection, a lit-up power switch and a circuit breaker.

One-for-All Energy Saver. This remote can control four devices, such as a TV and DVD player, while also cutting power to them. A button in the middle of the remote turns off electricity coming from one outlet. The remote wirelessly switches off a module that plugs into an outlet, cutting power to a single device or to a power strip that's attached to a bunch of them.



Stock# 1110-100000

STRIP, UTILITY OUTLET, 3-WIRE FUSED, 6-OUTLET FRONT AND 6-OUTLET REAR, RACK MOUNTING, 15 FT. CORD, SGL WABER, CAT.NO. RS 1215, NO SURGE SUPPRESSION



Stock# 1170-092000

CORD, MAJOR APPLIANCE, EXTENSION, 3-CONDUCTOR,TYPE 14/3 SPT, FLAT PARALLEL, ALL VINYL,1-OUTLET, MOLDED MALE PLUG/ FEMALE CONN.,6 FT. LONG, 15A, 125V.



Stock# 1170-094000

CORD, MAJOR APPLIANCE, EXTENSION, 3-CONDUCTOR,TYPE 14/3 SPT, FLAT PARALLEL, ALL VINYL,1-OUTLET, MOLDED MALE PLUG/ FEMALE CONN.,9 FEET LONG, 15A 125V.



Stock# 1170-102000

OUTLET STRIP, METAL, MASTER ON/OFF SWITCH, 15A CIRCUIT BREAKER, 15A/125V/1800W CAPACITY; BEIGE, 6 FT.CORD, 6 GROUNDED OUTLETS; NO SURGE SUPPRESSION; SL WABER CAT. # 6SPDX



Stock# 1170-102300

OUTLET STRIP, MOV SURGE SUPPRESSOR,15A,3900 JOULES, 8 OUTLETS METAL CASE,YELLOW/BLACK, W / SAFETY COVERS, 25 FT. CORD, LED, TRIPP-LITE P/N TLM825SA, GRAINGER P/N 2KGE3



Stock# 1170-102500

OUTLET STRIP, COMPUTER, SILICON AVALANCHE SUPPRESSOR DIODE PROTECTION, 3-WIRE CIRCUIT BREAKER PROTECTED, 6-OUTLET STRIP, 6 FT. CORD, TRANSTECTOR P/N 1101-058



Stock# 1170-203000

OUTLET STRIP, METAL, MASTER ON / OFF SWITCH, 15A CIRCUIT BREAKER, 15A/125V / 1800 CAPACITY, MOV SURGE SUPPRESSION, 15 FT. CORD, 10 OUTLETS, BELKIN SURGEMASTER 10, MFG. F9D1000-15 CDW P/N 1300366