

# fast facts

advancing safety, health, and workplace rights in the legislative branch

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## Power Strips and Dangerous Daisy Chains

The supply of readily available electrical outlets is inadequate in some buildings, especially older ones. To meet power supply needs, extension cords or surge protected power strips are often interconnected, or “daisy chained,” to readily provide more outlets and/or to reach greater distances. Another common solution is to create a “mixed daisy chain,” interconnecting extension cords and power strips. However, interconnecting these devices is a violation of Occupational Safety and Health Administration (OSHA) regulations and the National Electrical Code because doing so can cause them to become overloaded, leading to their failure and a possible fire. (See the Office of Compliance “Extension Cords” Fast Facts for more information)



Figure 1: Daisy Chain—Interconnected extension cords

### Daisy Chaining Found Frequently

Daisy chains and mixed daisy chains constitute some of the most common violations identified during recent Office of Compliance health and safety inspections. During the biennial inspection conducted during the 109th Congress, more than 2,400 instances of daisy chains and mixed daisy chains were observed, accounting for approximately 20% of all recorded violations.

### Problems

OSHA regulations require that conductors and electrical equipment be used in accordance with the conditions under which they are approved by a recognized testing organization (29 CFR 1910.303(a)). Most power strips are approved for providing power to a maximum of four or six individual items; however, when multiple power strips are interconnected, the one directly connected to the building outlet is often supplying power to far more than the approved number. This electrical current overload can result in a fire or can cause a circuit breaker to trip, deenergizing computers and other equipment throughout the area. The risk is magnified when another outlet in the same wall or floor receptacle is also overloaded in a similar fashion. When other outlets on the same circuit are also overloaded, the risk increases.

Extension cords are sometimes used to energize power strips in locations far from outlets. Because electrical resistance increases with increased power cord length, interconnecting cords increases the total resistance and resultant heat generation. This creates an additional risk of equipment failure and fire, particularly when paper and other combustible materials are in contact with the wires. Additionally, OSHA’s regulations allow extension cords to be used only as temporary wiring for up to 90 days. Unfortunately, once in place, extension cords tend to become permanent wiring and a fire hazard.



Figure 2: Mixed daisy chain—Power strip energized by an extension cord

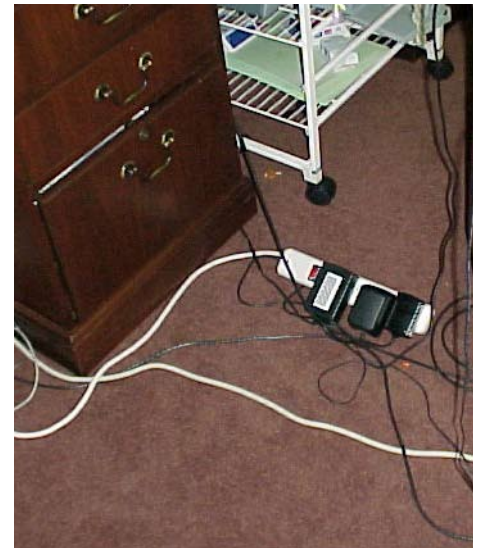
### Solutions

Several safe solutions exist. In many cases, a power strip energized by an extension cord or another power strip can simply be replaced by a power strip with a power cord of adequate length to reach an outlet. Alternatively, desks and associated equipment may be moved so they are closer to existing outlets. Other times, use of a power strip that is better able to accommodate bulkier transformer plugs solves the problem.

Several factors should be considered when selecting an appropriate surge protector. Since models vary in the amount of current that they are rated to safely carry, it is important to consider the amperage requirements of the devices to be energized. Models vary in length of power cord, typically ranging from three to 15 feet. Choose one whose length is most appropriate for reaching the intended room outlet. Avoid having too much excess cord, and make sure the surge protector is set on its base. Some have swivel plugs which makes them easier to connect to the outlet, and helps to protect the plug and cord from damage. Check each surge protector to make sure it is in good condition for use.

Only power strips equipped with internal fuses are acceptable as permanent wiring. Those lacking these fuses are equivalent to extension cords, and therefore may not be used as permanent wiring. When a power strip is installed, care must be taken to ensure that it is not suspended in mid-air by its power cord or cords plugged into it, resulting in excessive stress on electrical connections.

When there are not enough outlets to supply occupants' needs, one solution is to request the installation of additional outlets. Their placement should avoid any need to run any wires across walkways, where they can create tripping hazards (See the Office of Compliance's "Slips, Trips and Falls" Fast Facts). Consideration can also be given to the merits of installing modular furniture that provides multiple outlets at each workstation. Interconnected modular furniture units are energized by the building's electrical supply through a single, large power cord, or "whip," providing ample power to all served workstations. The OOC noticed during recent biennial safety and health inspections that many offices of newly elected House members have been outfitted with modular furniture. Many of the recipients of the OOC's Office Safety Awards during the 109th Congress were also equipped with modular furniture.



*Figure 3: Daisy chain of power strips—One power strip is being used to energize two other power strips*

## fast stats

- All conductors and equipment must be approved by OSHA (29 CFR §1910.303(a)).
- OSHA's electrical standards require that listed or labeled equipment be used or installed in accordance with any instructions included in the listing or labeling (29 CFR §1910.303(b)(2)).
- OSHA's electrical standards require that outlet devices have an ampere current rating not less than the current load to be served (29 CFR §1910.304(b)(2)).
- The NFPA reports that wiring, switches, and outlets caused an annual average of 280 electrical fires, and \$11 million in direct office property damage between 1999-2002.



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