WICHITA STATE UNIVERSITY
ENVIRONMENTAL HEALTH AND SAFETY

Extension Cords, Surge Suppressors and Power Strips

Extension cords, surge suppressors, and power strips are commonly used at the University. While extension cords are approved only for temporary use with portable appliances, power strips and surge suppressors may be used permanently if listed and in good condition.

POWER STRIPS AND SURGE SUPPRESSORS

Power strips (also known as relocatable power taps) must be UL 1363 listed and plugged directly into a wall receptacle. Surge suppressors must be UL 1449 listed and plugged directly into a wall receptacle. Units with 15and 20 amp circuit breakers and cords from three to 15 feet long are available. The total loading of all connected appliance must not exceed the capacity of the device. A general rule of thumb is to limit the connected load to 80% of the capacity. This can be calculated by tabulating the watts from connected devices and dividing it by 115 (volts). Most devices have labels with watt ratings. An example is provided below for a 15-amp surge suppressor:

DEVICE	WATTS
TWO DESKTOP COMPUTERS	500
FOUR 19 INCH LCD DISPLAYS	160
DESK LAMP	60
RADIO	15
TOTAL WATTS	735

Example calculations: Amps = watts/volts, 6.4 amps = 735watts/115 volts, 6.4/15.0 amps = 42% of capacity (and well below the 80% recommended limit)

Surge suppressors include a metal-oxide varistor (MOV) to protect your equipment from damaging power surges that can occur during utility shutdowns and electrical storms. Select a device with a high Joule rating and a feature that indicates the protective MOV device has not been damaged. Joule ratings vary from 200 to 1000 or more.
Replace the device if the indicator shows the unit is no longer functioning.

Power strip (no surge protection. Look for UL 1363 listing.

Surge suppressor with indicator. Look for UL 1449 listing

Surge suppressor daisy-chained to an extension cord, not allowed

Plug adapter without a circuit breaker, not allowed

EXTENSION CORDS

Extension cords are for temporary use only and typically for use with a portable appliance or for events with a maximum duration of 90 days. They should not be used in lieu of permanent wiring. Some buildings may not have the infrastructure to meet all operational needs. In these cases, the use of power strips and surge suppressors may be possible. In other cases, it may be necessary to expand the building's electrical system. Extension cords must be:

- Underwriters Laboratory (UL)-approved. (UL 817 for indoor and UL 2438 or "W rated" for outdoor use). Look for the UL Mark
- Minimum 16 gauge, double insulated, grounded and no longer than needed. We recommend no longer than100 feet for light duty, and 50 feet for medium duty (See the table below. Do not exceed the amperage rating of the cord.)
- Polarized when used with polarized appliances
- Not be daisy-chained with other cords, power strips, or surge suppressors
- Not be used in conjunction with large refrigerators, ice machines, or other high amperage appliances.
- Not allowed where flammable or explosive atmospheres exist

Inexpensive extension cord with 18 gauge wire, not allowed

Typical UL Listed 16 gauge grounded indoor/outdoor polarized extension cord

Grounded heavy gauge cord

Polarized non-grounded plug (one prong larger than the other)

A smaller "gauge" number indicates a thicker cord. A 16-gauge cord is considered light-duty and only appropriate for equipment up to 13 amps (e.g., portable lights and fans). A 14 gauge, or medium-duty cord, is suitable for equipment with draws from 14 to 15 amps, such as portable power tools. Equipment with draws between 16 and 20amps require 12 gauge (heavy-duty) or 10 gauge (extra heavy-duty) cords. This includes items such as air compressors and electric chain saws. When using cords greater than standard lengths, heavier cords are required. For planning purposes, the following table shows recommended gauge based on length of cord.

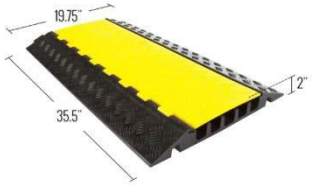
EXTENSION CORD LENGTH	0-2 AMPS	2-5 AMPS	5-7 AMPS	7-10 AMPS	10-12 AMPS	12-15 AMPS	16-20 AMPS
25 FT	16 GAUGE	16 GAUGE	16 GAUGE	16 GAUGE	14 GAUGE	14 GAUGE	12 GAUGE
50 FT	16 GAUGE	16 GAUGE	16 GAUGE	14 GAUGE	14 GAUGE	12 GAUGE	12 GAUGE
100 FT	16 GAUGE	16 GAUGE	14 GAUGE	12 GAUGE	12 GAUGE	10 GAUGE	8 GAUGE
150 FT	16 GAUGE	14 GAUGE	12 GAUGE	12 GAUGE	10 GAUGE	8 GAUGE	–
200 FT	14 GAUGE	14 GAUGE	12 GAUGE	10 GAUGE	8 GAUGE	–	–
300 FT	14 GAUGE	10 GAUGE	8 GAUGE	–	–	–	–
400 FT	12 GAUGE	8 GAUGE	–	–	–	–	–
500 FT	12 GAUGE	8 GAUGE	–	–	–	–	–

USE AND MAINTENANCE

Prior to use of an electrical cord, surge suppressor, or power strip, visually inspect it for damage. Damaged cords, surge suppressors, and power strips must be discarded.

The damage to cords often occurs because they are not protected. There are several key things to remember to protect a cord. These actions will greatly decrease the risk of electrical shock and fire.

- Do not attach flexible cords to building structures such as walls and ceilings, and especially not with nails, tacks, zip-ties, staples or other methods that may damage cords.
- Do not run flexible cords through walls, ceilings, floors, or windows, over drop down ceilings, or under doors, carpets or rugs, or false floors. This is a fire code violation and the condition of the cord cannot be verified if it is hidden from view.
- Provide a bridge for temporary cords placed across walkways and circulation paths to protect them and make them more apparent to prevent tripping. Other methods, such as duct tape, are less effective.
- Do not place cords over sharp or abrasive materials.
- Never kink, knot or twist cords.
- Always grip the plug to disconnect from an outlet. Do not pull by the cord itself.
- Never place cords where they will be driven or ridden over by a vehicle of any kind.



Bridge for temporary cords over walkways

ADDITIONAL INFORMATION

Flexible cords, cable and fixture wire by Mike Holts

COMMON VIOLATIONS TO AVOID

- Appliance powered by a power strip – Appliances must be plugged directly into a wall receptacle.
- Daisy chained power strips or extension cords – One strip or one cord only, directly into a wall receptacle.
- Suspended power strips – The power strip must lie flat on the floor/desk or be securely mounted.

For questions about this topic, contact EHS Fire Safety at 316.978.5803 or 5531.