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Damaged Power Cords: Know your electrical supply cord





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Power cords on electrical appliances that are moved frequently receive a lot of abuse. These include vacuum cleaners, floor polishers, power tools and other portable appliances. Often, the damage occurs at the plug (i.e., a missing ground prong on a three pronged grounded plug - Figure 1). Damaged and ungrounded power cords pose serious hazards to users of the appliance including electrical shock and risk of fire. Missing ground prongs on power cord plugs usually result from users pulling on the cord to remove the plug from the outlet instead of handling the plug directly. In some cases, the plug may be pulled from the wire covering, exposing the inner wires to damage, as shown in Figures 2 and 3. Power cords can become frayed or damaged from heavy use, age, or excessive current flow through the wiring.

Figure 4 shows a power cord to a shop appliance that was found on a recent inspection. This power cord has been sliced open exposing the inner energized wires. The appliance was still plugged in, ready for use. When a power cord is damaged, the appliance should be removed from service and the cord replaced as soon as possible to reduce the risk of electrical shock, electrocution or fire.

Cord damage can also result when the cord is pinched, caught between or punctured by heavy objects such as legs on a desk. This damage could lead to a short circuit and result in a fire. Also, cords placed under stress, such as when a heavy appliance is hung by its cord, could eventually cause damage to the cord or plug.

For greater detail on power cords, please see Fast Facts on “Power Strips and Daisy Chains” and “Exposed Energized Wiring,” available on our website, www.compliance.gov.

			
Figure 1 Ground prong broken off	Figure 2 Wire Cover pulled from plug	Figure 3 Plug pulled from casing & insulation	Figure 4 Frayed cord exposing energized wires

Power Cord Safety

Power cords are generally made up of three layers. The innermost layer is composed of two copper wires used to carry an electrical current to an appliance together with the ground wire. Next, the insulation layer directly covers the wiring to protect it from damage and short circuits or electrical faults. Lastly, the outer layer, consists of rubber or plastic that is molded around the wires, and of insulation for further protection from mechanical damage and wear. Each electrical appliance power cord is evaluated by an electrical testing laboratory. Samples are tested to verify that the cord is safe for normal use when following the manufacturer's instructions. The testing laboratory issues an approval or listing of the cord indicating that it meets applicable requirements. The Occupational Safety and Health Administration (OSHA) requires all electrical equipment over 50 volts be approved by a recognized testing laboratory. It is incumbent upon the user to make certain that the power cord remains in serviceable condition.

The Office of Compliance has found many damaged power cords during its inspection work and recommends that users of the electrical tool or appliance inspect the power cord before and after each use. This could help prevent a personal injury or fire.

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- OSHA 29CFR§1910.303(a) states that electrical powered equipment must be approved in the manner prescribed by OSHA and one of its recognized testing laboratories. OSHA 29CFR§1910.334(a)(3)(ii) requires that attachment plugs and receptacles may not be connected or altered in a manner which would prevent proper continuity of the equipment grounding conductor. Further, 29CFR§1910.334(a)(2)(ii) provides that if there is a defect or evidence of damage to electrically powered equipment, the defective or damaged item shall be removed from service and no employee may use it until repairs and tests necessary to render the equipment safe have been made.
- The National Fire Protection Association's (NFPA) National Electrical Code, NFPA 70 section 250-114 states that equipment powered by cords and plugs with exposed non-current carrying metal parts likely to become energized shall be grounded for various listed appliances, and if an appliance has a ground prong on its power cord plug, it must not be removed. Continuing use of appliances with damaged power cords is a violation of the National Electrical Code, NFPA 70 in sections 110-2, 110-3(a) and (b), 110-27(a), and 250-2(b)-(d).
- The NFPA reported that in 2008, electrical fires, electrical failures or malfunctions resulted in an average of 53,600 home fires each year. These fires caused more than 500 deaths, injured 1,400 people, and accounted for \$1.4 billion in property damage.
- The Bureau of Labor Statistics of the U.S. Department of Labor reported that in 2007, private sector workers suffered 1,100 electrical burn injuries and 1,480 electrical shock injuries.



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