

HAZARDS OF ALUMINUM WIRING

ALLIANZ RISK CONSULTING



Image: Shutterstock

INTRODUCTION

During the late 60s and early 70s aluminum wiring became a popular substitute for copper in many buildings because of its availability and low cost. Since then, it has been determined that aluminum wiring was responsible for many building fires, and most local building codes now prohibit its use in new structures.

Aluminum wiring can be identified by the letters "AL" or the word "Aluminum" and a manufacturer's name stamped on the plastic or cable covering. Although no longer in general use in newer properties, aluminum wiring is still employed today in certain applications, such as 240-volt circuits on cooking stoves and clothes dryers. It is also used in some localities in the main service entrance wiring from the distribution line.

WHAT ARE THE HAZARDS OF ALUMINUM WIRING?

There are three primary reasons why aluminum wiring may be hazardous:

- Unlike copper, aluminum wire expands when warmed and contracts when it cools. This phenomenon, known as "cold creep," causes aluminum wiring to lose its ability to maintain a tight fit on electrical connections.

- Aluminum oxidizes, or corrodes, when in contact with other types of metals, resulting in an increase in resistance, causing heat and more oxidization. In time, the wire may get so hot it melts its insulation and the fixture it's connected to, causing a possible fire.
- Aluminum is more malleable and softer than copper, which makes it easier to nick or cut during installation.

WARNING SIGNS OF HAZARDOUS ALUMINUM WIRING CONDITIONS

- Unusually worn or warped outlets and switch plate covers.
- Smoke or sparks from receptacles and switches.
- Strange odors in the area of receptacles and switches.
- Unexplained problems with plug-in fixtures and appliances.
- Periodic flickering of lights.

WHAT SHOULD YOU DO IF YOU HAVE ALUMINUM WIRING IN YOUR FACILITY?

If you find aluminum wiring in your building, don't panic. Aluminum wiring, when properly installed, can be just as safe as copper. Its danger lies in improper installation.

If you own or occupy a building that falls within the dates mentioned above, and you are unsure of the type of wiring that is installed your home, hire a licensed electrician or inspector (aluminum wiring is not a handyman's task) to check for the following conditions:

Properly rated fixtures. A properly rated outlet or switch that is directly attached to aluminum wiring should be stamped "Al/Cu" or "CO/ALR." The latter supersedes the former, but both are safe. These fixtures are usually more expensive than those used for copper wire.

Tight connections. Wires should be properly connected (wrapped at least three-quarters of the way around the screw in a clockwise direction). Connections should be tight. While repeated tightening of the screws can make the problem worse, it would be wise to make sure each connection is tight during the inspection. Note that aluminum wiring may still be used for the main service entrance cable, which should also be examined during the inspection.

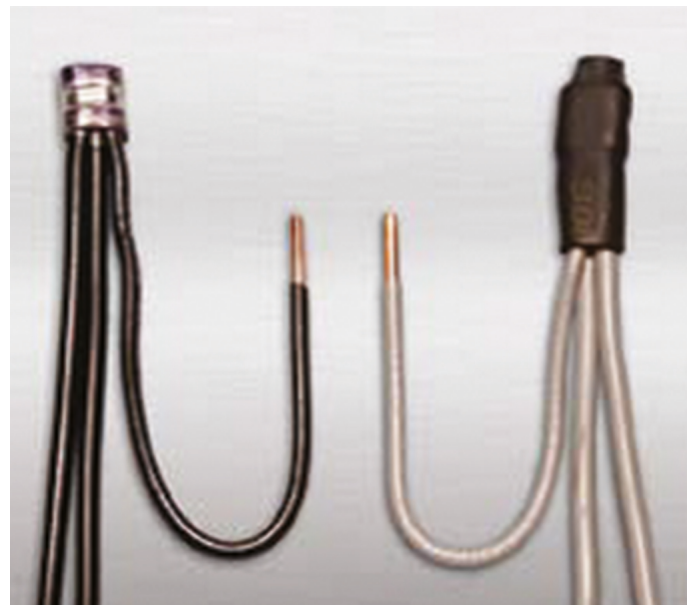
"Push-in" terminals. The use of this type of terminal presents an extreme hazard when used with aluminum wire. Any push-in terminal should be replaced with an appropriate screw connector immediately.

Signs of overheating. Blackened wires and connections, melted insulation, or "baked" fixtures should be repaired or replaced immediately.

CONSUMER PRODUCTS SAFETY COMMISSION (CPSC) REPAIR RECOMMENDATIONS

In the CPSC Publication 516, three approved aluminum wiring repair methods are recommended.

- Completely replace all aluminum wiring with copper wiring.
- The COPALUM repair method is recommended by CPSC on the basis of CPSC sponsored research, laboratory tests, and demonstration projects. This repair method has been thoroughly proven by more than a quarter of a century of field experience to provide a permanent, low-resistance electrical connection to aluminum wire. The COPALUM repair method eliminates the aluminum connection failure problems and still uses the existing, installed aluminum wire.



COPALUM Photo from CPSC Publication 516

- CPSC staff recognizes that copper replacement may be cost prohibitive and that the COPALUM repair may be unavailable in a given locality. Based upon an evaluation that was, in part, CPSC supported, consumers are advised that, if the COPALUM repair is not available, the AlumiConn connector may be considered the next best alternative for a permanent repair. This repair method involves pig tailing using a setscrew type connector instead of the COPALUM crimp connector in the repaired connections.



AlumiConn Photo from CPSC Publication 516

Inspections and repairs involving aluminum wiring can be expensive, but a loss to fire could be more costly in terms of life and property.

RESOURCES:

Consumer Products Safety Commission –
<https://www.cpsc.gov/s3fs-public/516.pdf>

Design: [Graphic Design Centre](#)

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