ALUMINUM WIRING

Background on Aluminum Wiring.

A shortage of copper in the mid 1960s caused builders to increase the use of aluminum wire in residential electrical distribution systems from the few large-power circuits (i.e., for electric clothes dryers and ranges), to general purpose 15- and 20-ampere-rated circuits.

Homes built before 1965 are unlikely to have aluminum branch circuit wiring. Electrical cables installed between 1965 and the mid 1970s in new homes, in additions, and as part of rewired/new circuits may contain aluminum wiring

IDENTIFYING ALUMINUM WIRING

Virtually all of the aluminum wiring was installed as plastic-sheathed cable (type NM, often called “Romex”) with no readily discernable distinction from a cable with copper conductors.

Look at the printed or embossed markings on the outer jacket of the electric cables, which are visible in unfinished basements, attics, or garages

Cable with aluminum conductors will have “Al” or “Aluminum” and other information marked on one side of the cable jacket every few feet along its length. (Note: be sure to read as much of the marking as possible because the marking “CU-clad”

or “Copper-clad,” in addition to the “Al” or “Aluminum,” means that the cable uses copper-coated aluminum wire and is not covered by the repair recommendations

If you are unable to identify the type of wire in your home by this method, but you suspect that you have aluminum wire, have a qualified electrician make the determination.

What is the difference between copper and aluminum wiring?

Was aluminum as good as copper? Not quite. It was recognized from the beginning that copper is a better conductor of electricity. The manufacturers and the authorities adjusted for that by using slightly larger aluminum wire to perform the same work as copper. Most branch circuit wiring in homes is 14-gauge copper. The equivalent aluminum wire is 12 gauge. Remember, though: 12 gauge is *larger* than 14!

ALUMINUM WIRING

The installation methods were exactly the same for aluminum as for copper.

What are the Issues with Aluminum Wiring?

Shortly after aluminum wiring became popular, some problems started to appear. These included flickering lights, warm cover plates on switches and receptacles, and burned insulation on wiring. There was an overheating issue, and overheating can mean fires. They looked into it and found there were three other differences between copper and aluminum.

1. Softness: Aluminum is a much softer metal than copper. Electricians who had always worked with copper found that it was very easy to nick, cut, or crush the aluminum wiring when removing insulation or making connections. They had to be gentler. Damaged wire creates local hot spots and results in overheating.

2. Creeping: When electricity flows through wire, the wire heats up. Aluminum wire expands more than copper when it heats up. The repeated expansion and contraction as the wire heated up and cooled down caused to the wire to creep out from under the terminal screws that held the wire in place. This wire creeping resulted in loose connections and overheating.

3. Corrosion: When metals corrode, they form an oxide on the surface. Corrosion on steel is red, copper is green, and on aluminum is white. It's not a big problem when copper wiring corrodes, since the copper oxide that

forms is electrically conductive.

It doesn't interfere with the wire's ability to do its job. When aluminum wiring corrodes the white oxide is not a very good electrical conductor. It does interfere with the flow of electricity, and again, can cause overheating

Has Aluminum Wiring Been Recalled?

ALUMINUM WIRING

We hear regularly that aluminum wiring has been recalled and that it is no longer approved or permitted in homes—neither of these is true. Aluminum wiring is permitted with the appropriate installation methods and material,

The U.S. Consumer Product Safety Commission (CPSC) staff and other government officials have investigated numerous hazardous incidents and fires throughout the nation involving aluminum branch circuit wiring.

A national survey conducted by Franklin Research Institute for CPSC showed that homes built before 1972, and wired with aluminum, are 55 times more likely to have one or more wire connections at outlets reach “Fire Hazard Conditions”1 than homes wired with copper. That survey encompassed only the wire connections at outlets. It did not address other types of aluminum wire connections and splices in homes that are also prone to fail. No information was developed for aluminum-wired homes built after 1972.

The home inspector included a statement about aluminum wiring in the report does that mean there is a problem?

The home inspectors’ job is to provide you with a better understanding of the home you are purchasing. This means that sometimes the will not only identify defects and items in need of repair or replacement, but they will also point out conditions that they feel you should be made aware of.

In fact, the NC Home Inspector Licensing Board has provided suggested language for Aluminum wiring and encourages home inspectors to use this specific language whenever they encounter the material.

Can it be repaired or is replacement required?

Aluminum wiring can be replaced or repaired to effectively and permanently reduce the possibility of fire and injury due to failing (overheating) wire connections and splices. It is highly recommended that you hire a qualified electrician to perform this remediation.

What are the repair options?

There are 3 basic repair options available a summary of these options follows. We always recommend that you consult with a qualified and licensed electrical contractor for their recommendations and opinions.

1) Complete Replacement with Copper Cable

ALUMINUM WIRING

Replacement of the aluminum branch circuit conductors with copper wire eliminates the primary cause of the potential hazards, the aluminum wire itself. Depending on the architectural style of your home and the number and locations of unfinished spaces (e.g., basements and attics), it may be relatively easy for a qualified electrician to rewire your home. A new copper wire branch circuit system would be installed, and the existing aluminum wire could be abandoned inside the walls. This is the best method available; but for many homes, rewiring with copper is impractical and/or prohibitively expensive.

2) COPALUM Method of Repair

As an alternate to rewiring with copper, CPSC recommends attaching a short section of copper wire to the ends of the aluminum wire at connection points (a technique commonly referred to as "pigtailing"), using a special connector named COPALUM to join the wires.

Pigtailing with a COPALUM connector

is considered to be a safe and permanent repair of the existing aluminum wiring. The repair should include every connection or splice involving aluminum wire in the home, including outlets, dimmers, switches, fixtures, appliances, and junction boxes. The repaired system, with short copper wire extensions at every termination throughout the home, permits the use of standard wiring devices, including receptacles and switches.

3) Acceptable Alternative Repair Method

Copper replacement may be cost prohibitive and that the COPALUM repair may be unavailable in a locality, 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 pigtailing using a setscrew type connector instead of the COPALUM crimp connector in the repaired connections.

The repair should be conducted by a qualified electrician because careful, professional
workmanship and thoroughness are required to make the AlumiConn connector repair safe and permanent.

ALUMINUM WIRING

My home is newer but has aluminum wiring should I be concerned?

Aluminum wiring is still used in most homes. Braided or twisted aluminum wiring is common for larger load circuits and does not exhibit the problems associated with the smaller 15-20-amp circuits. So, in short this does not present a concern.

Is newer aluminum wiring okay?

The performance of aluminum wiring has improved significantly. However, by the time the aluminum wiring issues were identified, aluminum had received enough bad publicity that it became unmarketable. By the late 1970s, it was no longer used by most builders, although it is still approved and less expensive than copper. New alloys have improved the reliability and performance of solid strand aluminum conductors and as such you may see some use on larger circuits (30 amps) along with the multi-strand conductors for larger appliances and service entrances are commonly used.

I've heard that I may not be able to insure the home if aluminum wiring is present?

First just because you have aluminum wiring it does not mean that your home is un-insurable. Remember there are different type of aluminum wiring and only those that pose a problem are of a concern,

Secondly, the home insurance world became aware of the issues around aluminum wiring, and some insurance companies refuse to insure homes with aluminum. Others require a certificate from a licensed electrician or the electrical authority. These decisions are

ALUMINUM WIRING

usually made on conservative underwriting criteria rather than actual loss experience.

What should I do?

Your professional home inspector is looking out for your best interest and has made you aware of a potential condition that may exist in the home you are purchasing.

You should take the time to do your own research on the material and reach your own informed conclusion. There is a lot of information available on this topic some is well balanced, and others are alarmist.

You may want to consult with several licensed electrical contractors that you know, and trust will provide you with an honest answer based on their experiences.

You should be aware that some of the recommendations may be based upon perceived liability and most plumbing professionals do not want to accept the liability for predicting future performance of a questionable product or for future failures of that product and will most likely make the safest suggestion and recommend possible.

Ultimately, you must decide what level of risk you are willing to accept, and what you are comfortable with.

Summary

There were a lot of homes built with aluminum wiring, and a lot of older homes that were updated with aluminum during the 1960s and 70s. What about all these homes that still have aluminum wiring If proper connections and terminations are made without damaging the wire and using approved materials installed in accordance with building, electrical codes and the manufacturer's instructions aluminum wiring can prove reliable.

The best practice is to consult with a licensed electrical contractor and have an electrical audit performed to ensure their home is safe.

Should you see evidence of problems including flickering lights, warm cover plates, discoloration, and melted insulation consulting with a licensed electrical contractor is advised.