Ask Jon Eakes

Still worried about Aluminum wiring.

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Rick writes: I HAVE BEEN TO YOUR WEB SITE BUT STILL HAVE SOME QUESTIONS ON THIS TOPIC. HERE GOES: FIRST, IF THE OVERHEATING OCCURS, WHY DOESN'T THE CIRCUIT TRIP? AN ELECTRICIAN TOLD ME THAT IF I HAD A SWITCH PANEL VERSUS FUSES, THAT THIS WOULD PROTECT ME!

Both fuses and circuit breakers (neither one works better than the other on this question) are specifically designed to trip when a certain amperage goes through. The calculation of that safe amperage is based on what is a safe temperature rise in a healthy wire of the appropriate size attached to that fuse or circuit breaker. In the case of the problems with aluminum wiring that is either poorly connected to a terminal, or connected to the wrong kind of terminal, or poorly attached to a copper wire in a pigtail -- what happens is that the electricity ends up flowing through a very small part of the wire. In the case of the pig tails it has been shown that often all the electricity flows from the aluminum wire, through the threads on the connector and then into the copper wire, there being very little electrical contact between the copper and aluminum directly. A lot of electricity through a small wire can turn it red hot without going beyond the amperage limit of that circuit breaker. Hence the breaker does not trip, or the fuse does not blow, but there is red hot metal and melting plastic in the walls.

ALSO, THE PROPER BOXES I BELIEVE ARE PRESSURE TYPES WHERE THE WIRE IS INSERTED INTO A SLOT THAT CLAMPS DOWN ON THE WIRE. WHERE WOULD YOU PUT THE ANTI-OXIDANT CREAM OR DO YOU NEED TO WITH THESE? DOES THE CREAM WEAR OFF AND REQUIRE RE-APPLICATION AFTER SO MANY YEARS?

Terminals specifically made for aluminum wires are designed to maintain good metal contact over the life of the fixture. They need no anti oxidant.

OUTLETS AND SWITCH BOXES ARE ONE THING, BUT WHAT ABOUT WHERE COPPER AND ALUMINUM COME TOGETHER IN A CONNECTOR.....DO YOU JUST APPLY THE CREAM ALL OVER THE TWISTED CONNECTION THEN REAPPLY THE CAP?

More than that. Start with a bit of the anti-oxidant as a lubricant on a piece of emery cloth and actually sand off the oxidation on the old aluminum wires. Clean the copper wire while you are at it. Leave the cream in place to prevent oxidation while working. Twist the wires together so that they have good mechanical hold on each other. The connector is not designed to twist the wires, only to protect twisted wires. Fill the connector with cream. Insert the connector. That is supposed to be a permanent solution. However there is some serious data from the states that indicate that this should not be considered more than a temporary fix. The permanent one is using the special high pressure connectors that assure permanent metal to metal full contact.

REWORKING THE ALUMINUM MAKES IT BECOME WEAK, AND CLOSE TO SNAPPING OFF. DOES THIS INCREASE THE DANGER? IT DOESN'T SEEM AS "MALLEABLE" AS COPPER?

Good point. In fact if you "feel" it getting weak -- it will in fact present resistance to the passage of electricity and will heat more than normal. Week ends should be cut back.

ALSO, IT SEEMS TO ME THAT SINCE THIS WIRING WAS APPROVED FOR USE BY AUTHORITIES, THAT WE SHOULD BE ABLE TO SUE OR RECOUP REPLACEMENT COSTS FOR THIS. HAVE YOU HEARD OF ANYONE SUCCEEDING AT THIS? AND WHO WOULD WE APPROACH, WHAT AUTHORITY?

I have heard of no successful suits in Canada (we are not yet totally run by lawyers as in the states), primarily because it is good and valid wiring if used properly. It is improper attachment of copper type fittings that has created the problems.

AND FINALLY, I GUESS I AM ANXIOUS TO KNOW YOUR OPINION ON JUST HOW DANGEROUS THIS STUFF IS...WHAT IS THE LIKELIHOOD OF SOMETHING REALLY HAPPENING? SHOULD I

JUST HAVE IT ALL REPLACED?
I don't consider it dangerous. But I do believe that a homeowner should actively keep an eye out for warm plugs and switches or any signs of overheating of wires. A one time tightening of all the screws in the fuse or circuit breaker box is a good idea, if it was not done about a year after the original installation. An additional safety factor can be obtained by using the new "arc-fault circuit breakers", as these will trip when there is arcing even if the current flow is far below the breaker limit.
MANY QUESTIONS JON, BUT I GUESS YOU CAN SEE I AM WORRIED. I HAVE GOTTEN DIFFERENT RESPONSES FROM DIFFERENT PEOPLE AND HAVE THE IMPRESSION NO ONE REALLY KNOWS FOR CERTAIN!
I think that the Americans are making some very good points about some of the approved connectors. The Canadian standards group has not even looked at the question, simply accepting the American research on the question. The real solution is using the hard to come by CopAlum connectors, or the Troque driven AlumiCon connectors -- see here.
MY WEB BROADCAST BROUGHT UP THIS ADDITIONAL QUESTION: IF I HAVE AN OLD JUNCTION BOX WITH OLD CIRCUIT BREAKERS INSTALLED FOR ALUMINUM WIRING, CAN I USE THIS SAME BOX FOR ALL THE NEW COPPER WIRING THAT IS GOING THROUGHOUT THE HOUSE?
My favorite electrician, John at www.Electrika.ca, responded to this question with a lot of field experience: "The most important thing in an older home with old wiring systems and also aluminum is you have the right over current protection (circuit breakers). We are going into so many homes with (brand name) equipment some of which have lost their CSA rating. It is recommended if your panel is over 25 years old it should be updated. You have current flowing through plastic components for 25 years. We are finding in this old equipment the breakers are not tripping in some cases causing the melting and fires in equipment and wiring. Jon, we would never rewire a home and put all the new branch circuits into an old out dated panel. We are even finding used old panels taken out of old commercial buildings and reinstalled in the clients homes but I'm sure they were charged for new equipment."

ONE RADIO LISTENER VOTES FOR REWIRING
Following my radio broadcast on this topic in December of 2021, Graeme weighted in with photos to show why he thinks that pulling new copper wire throughout the house is the best way to go... Expensive yes, but piece of mind.

This is a stove plug connection. The joints were tight, the male and female plug seemed in good shape. However the red wire had a radical bend in it which probably stressed the wire. You can see a "pop out" area in one strand of the wire and over heating effecting the red plastic cover.

Here is a close-up of the strand of wire about to burn through.

Follow this link for more information on Al/Cu Connectors.
Click here for information on the LEGALITY OF DIY ELECTRICAL WORK.

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