

Aluminum wiring

Many of the cabins at Aspenhof were built when aluminum wiring was popular. While lighter and less expensive, aluminum has some disadvantages when used as electrical wiring.

The thermal coefficient of expansion of aluminum is greater than that of copper. In a typical connection the wire will be pinched between two parallel surfaces such as the underside of a screw head and the face of the mounting plate beneath it. Since the aluminum wire expands more than the surrounding copper parts when temperature increases, and since aluminum deforms easily, the expansion forces it to flow sideways, assuming the shape of a flattened oval.

When the wiring cools again the connection will be loose. The next time current passes through this loosened connection the higher resistance causes it to overheat and a fire is possible. Notice how the wire nuts and tape in the lower right corner of this junction box have melted.

Aluminum also oxidizes very quickly in air and if connectors do not break through the oxidized surfaces a high-resistance connection results. This is often overcome by applying an oxide-inhibiting paste inside the connector.

This phenomenon could be abated by the use of connections designed specifically for aluminum wiring but not all electricians used them. In my own cabin I checked several circuits and was able to tighten the connection screw as much as a full turn on some.



CAUTION: this is a job for a very advanced do-it-yourselfer or professional electrician only. Unless you are perfectly aware of the properties of electricity and the nuances of residential wiring do not attempt it yourself. Call an electrician who is experienced enough to understand what he is looking for and have him inspect your wiring and keep your cabin from burning down.

Connectors and terminals marked “CU/ALR” or “AL/CU” are suitable for aluminum, copper, or copper-clad aluminum wiring. Those marked “AL” are suitable for aluminum only. Those marked “CU” or not marked at all should only be used with copper conductors. Remember that this applies to light fixtures, receptacles and switches as well as inside the service entrance box.

Another problem area in older wiring is the use of circuit breakers manufactured by Federal Pacific Electric. FPE breakers are prone to internal contact problems which cause them to arc and overheat. In many cases this can be clearly observed as the external surface of the breaker becomes warm to the touch after a load current has passed through it for some length of time. In milder cases the temperature rise can be seen only by an infrared-sensing thermometer. Owners who are experiencing this problem may not have to replace the entire FPE service entrance box if they can locate a source of a Canadian-made circuit breaker designed for use in the same box. My sources indicate that the Canadian-made replacements do not suffer from this problem.

I am not a professional electrician nor do I have an electrician’s license. If I were looking for a professional to diagnose or repair these problems I would look for someone with enough practice and experience in this area to have seen, and cured, these problems before. I have no recommendations in the Warren County area – other owners may be willing to share their findings in this area.