

Application: Using mixed foils in multi-zone and combination flexible heaters and circuits.

All flex uses a variety of materials when building flexible circuits and heaters, most common are copper for circuits and cupronickel (CU-NI) or Constantan for heaters. For many designs these materials are appropriate and will result in the lowest cost for the customer. However, for more complex or precise designs incorporating the benefits of different metals will greatly improve the design and allow for more accuracy. All Flex has continued to see more and more heater designs that incorporate multiple heated zones and require many surface mount components. By simply adding a layer or two of copper to run traces for components and power for the heated zones we are able to maximize the heated areas in the desired zones and reduce heat generated in unwanted areas. This can often reduce assembly complexity and reduce assembly size. The use of mixed foil designs is also applicable for super computing designs where the thermal conductivity of these foils can be mixed to meet design requirements. Currently All Flex has been building mixed foil designs with up to 8-layers of foil and up to 60 inches in length. Some of the thermal and electrical properties for our most common foils can be seen below. All Flex has also used other foils such as Aluminum and Nickel, but additional design and manufacturing time may be needed for these metals.

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	Copper	CU - NI 715	Constantan
Electrical Resistivity @ 20C	1.71 Microhm• cm	41.2 Microhm• cm	50.8Microhm• cm
Temperature Coefficient of Resistivity (0-100C)	3900 PPM / °C	± 40 PPM / °C	± 30 PPM / °C
Electrical Conductivity @ 20C	586 MEGMHO• cm	26.2 MEGMHO• cm	20.4 MEGMHO• cm
Thermal Conductivity @ 0C	390 W / m• K	29.4 W / m• K	21.2 W / m• K
Electrical Resistivity @ -273C	19,600 W / m• K	0.5 W / m• K	0.18 W / m• K

