

Introduction

Barry Industries offers parts using flanges made from both copper tungsten (CuW) and copper (Cu) flange materials. In the case of the copper tungsten flange material the construction is 100% brazed. Copper flange construction uses an appropriate solder material to attach the ceramic part to the flange. For higher power components the tradeoffs between the two forms of construction become a critical decision for the user.

Copper Tungsten Flange

The use of CuW flanges provides a good thermal expansion match between the ceramic and the flange. As power levels – and hence ceramic chip size – increase, this matching becomes more critical. This becomes even more important if the part is subject to power or temperature cycling. The all brazed CuW part solves this problem and provides the highest reliability part for all applications.

Unfortunately, as with any engineering solution there is always a compromise and the penalty with CuW is that there is a significant cost increase due to the high price of the flange material.

Copper Flange

Copper flanges cost significantly less than CuW and are hence widely used in many parts. However, there is a significant thermal expansion mismatch between the ceramic chip and the Cu flange. The higher power devices use larger chips and flanges and any mismatch is accentuated. Soldering of the part provides some stress relief but for parts from approximately 500 watts and higher this mismatch becomes a problem.

Barry Industries supplies – as do other companies – 800 watt parts on Cu. These perform adequately as long as the parts are operated at constant power levels and temperature. If they are subjected to significant temperature cycling or pulsed power application then the parts will fail at some stage.

This is neither a reflection on the Barry parts nor the processes used. It is the fundamental physics of material properties and applies to all parts mounted to copper flanges.