

Low Thermal Resistance

Thermal resistance is a measure not only of a materials ability to transmit heat but of its ability to let heat into it, to transmit the heat through, and out the other side Thermal Resistance is a measurement of the difference in temperature between the component and the heat sink. You want this difference to be as small as possible indicating that the material is doing a good job of getting heat from the component, transmitting that heat through the interface, and in sending the heat to the heat sink. This is what you are trying to accomplish in the most elegant, most reliable, and least expensive way possible.

Specmanship is the art of obfuscation; of making tests that look good in the laboratory, but have little to do with the practical problem at hand.

It is very important to test materials in the exact application where you are considering using them. Component and heat sink surfaces are not smooth, they are not always flat. Any test apparatus that has highly polished, flat surfaces, and which has a lot of magnum size bolts to provide enormous closure forces is "Specmanship" and only going to make the manufacturing department angry. It will make them angry because they will never get the results that the lab gave to engineering and which you are supposed to get in production. Our standard test apparatus replicates conditions found on the production floor. The test device is described in detail in our brochure.

Thermal Resistance is measured in °C/W/in². The Orcus test setup consists of two 2x2x1" thick aluminum blocks. The top block has cartridge heaters (40W total) in it and is called the "hot-block". The bottom block has no heaters and is called the "cold-block". Each block has a thermocouple hole in it. The interface material is placed between the defined roughness surfaces of the two blocks, a weight is placed on the blocks to provide a constant closure force. The temperature of the two blocks is observed until the hot block reaches 100C. Then the temperature difference of the two blocks is noted.

The Thermal Resistance in °C/W/in² is:

$$\frac{T1 - T2}{\text{-----}} \times 4$$

40Watts

It is necessary to multiply by 4 because the blocks are each 2x2=4in².