THERMFLOW® T766
Thermal Impedance Test Report
(Effects of Pressure and Temperature)

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T766
Thermal Impedance Test

Introduction

Testing was performed in Chomerics' Research and Development Department to quantify the effects of pressure and temperature changes in the thermal performance of T766 phase change material. The first sample was tested at pressures ranging from 5 to 150 psi. The second sample was tested at temperatures ranging from 20 to 70°C. The results are documented in this report to help the customer better understand the T766 material performance under such conditions. These results can serve as a reference for the necessary pressures and temperatures required to achieve a desired level of thermal performance from T766.

This data is intended to be used as a reference only.

Please contact our Applications Engineering Department for additional information at 781-939-4620

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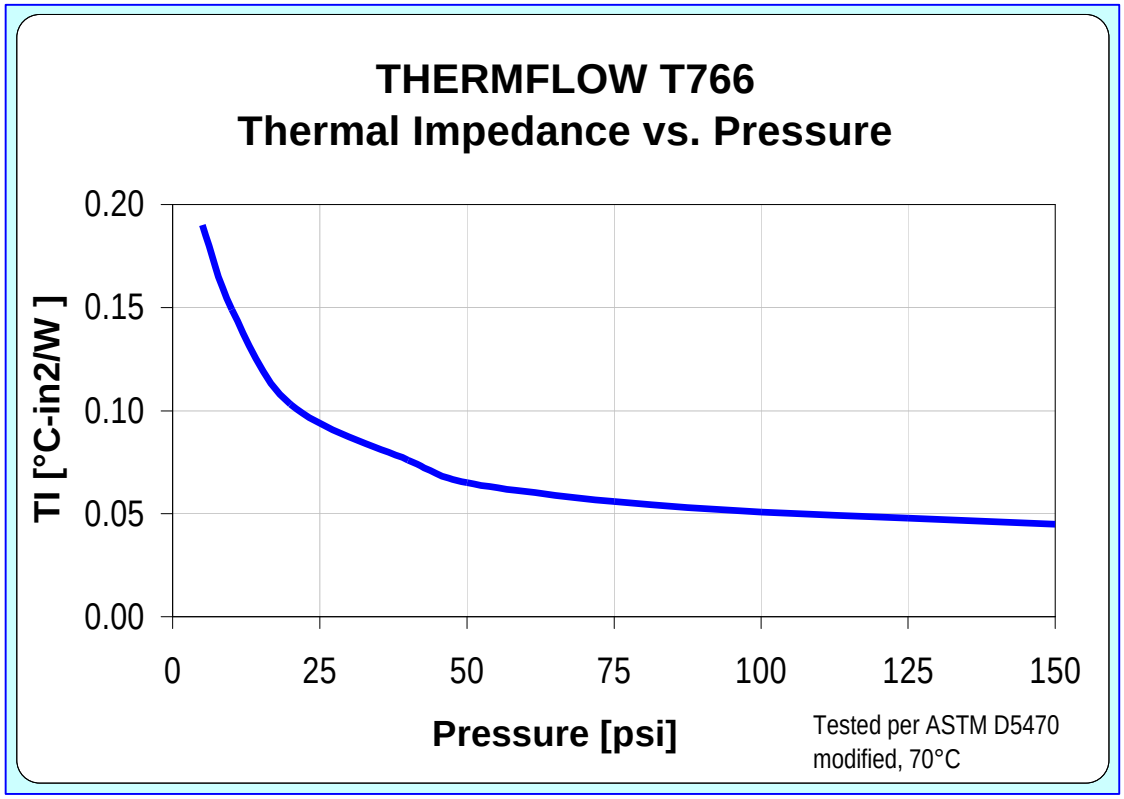
I. Thermal Impedance vs Pressure

Standard Thermal Impedance testing was performed at 70°C. The test started at very low pressures of 5 psi and incrementally increased until 150 psi was obtained. The change in impedance is very minimal in pressures above 75 psi.



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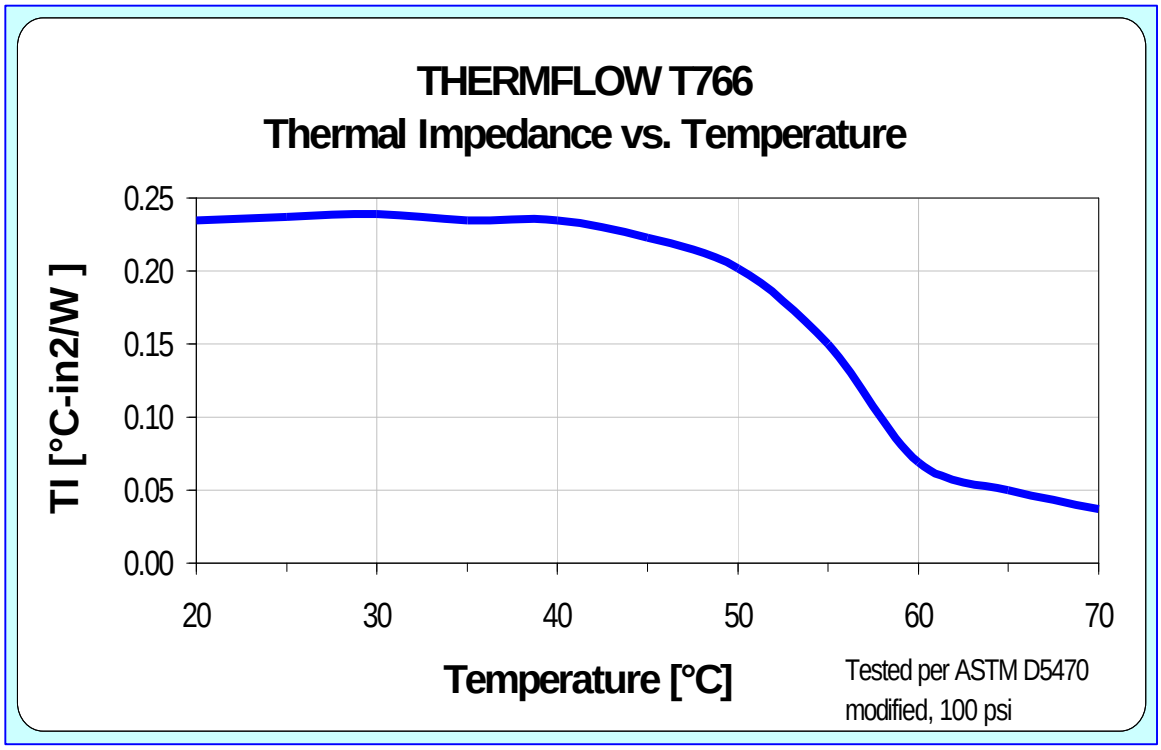
II. Thermal Impedance vs Temperature

Standard Thermal Impedance testing was performed at 100psi. The test began at temperatures of 20°C and increased in small increments until 70°C was obtained. A significant decrease in thermal impedance was observed once the T766 polymer reached its phase change temperature range of 51-58°C.



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Summary

Pressure versus impedance testing shows that the change in thermal impedance is very minimal in pressures above 75 psi. T766 needs some pressure in order for the polymer side to wet out the surface and flow. The higher the pressure, the better the polymer will be able to flow and displace air, causing a thinner bond line. The thinner the bond line and the more intimately the conformable metal carrier contacts the surface, the lower the thermal impedance of T766.

Temperature versus impedance testing shows that a significant decrease in impedance was observed once the T766 polymer reached its phase change temperature range of 51-58°C. A slight decrease in TI was seen at temperatures above 40°C as the polymer neared the phase change temperature range. The polymer needs to go through its phase change in order for it to flow into interstices on the surface and achieve that intimate contact that is so important for efficient thermal transfer. Once the interface material reaches its phase change temperature range, with applied pressure, T766 will continuously operate with very low thermal impedance at all temperatures.

Please note, in most practical applications, T766 will remain in an assembled state at application pressure. In order to achieve its minimum thermal impedance value, T766 must cycle through its phase change temperature at least once. This initial phase change allows the polymer to wet the surfaces in which it contacts, fill the interstitial voids in the surfaces, and attain its minimum thickness. After this one time cycle, the material does not need to reach the phase change temperature again for best thermal performance.

Conclusions

Thermflow™ T766 needs to reach temperatures above 58°C for optimal thermal performance. The higher the pressure exerted on T766, the lower the thermal impedance of the material. As the pressure exceeds 75 psi, a small gain in thermal performance is achieved.

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