TGrease 980
Reliability Report
October 2009

Contents

Section: 1 Overview

Purpose: To test the reliability of TGrease 980 as well as confirm that the thermal resistance of TGrease 980 does not degrade as a result of thermal cycling, high temperature baking, or baking in a high humidity environment.

Reliability is defined as:
1. The ability of an item to perform a required function under stated conditions for a specified period of time.
2. The probability that a functional unit will perform its required function for a specified interval under stated conditions.

The required function of TGrease 980 is to transfer heat from a hot component to a heat dissipating device. Its functionality is measured by testing its thermal resistance. The thermal resistance range that defines the functionality of the TGrease 980 is 0.005°Cin2/W to 0.015°Cin2/W at 50psi as measured by modified ASTM D5470.

Conditions:
Thermal bake 150°C for 2000 hours
Thermal bake 125°C for 2000 hours
Environmental chamber 85°C and 85% relative humidity for 2000 hours
Thermal Shock -55°C to 125°C for 2000 cycles
Power cycling 120°C to 25°C for 4000 cycles

After each 250 hour/cycle interval, sample disks from each condition were evaluated for thermal resistance.

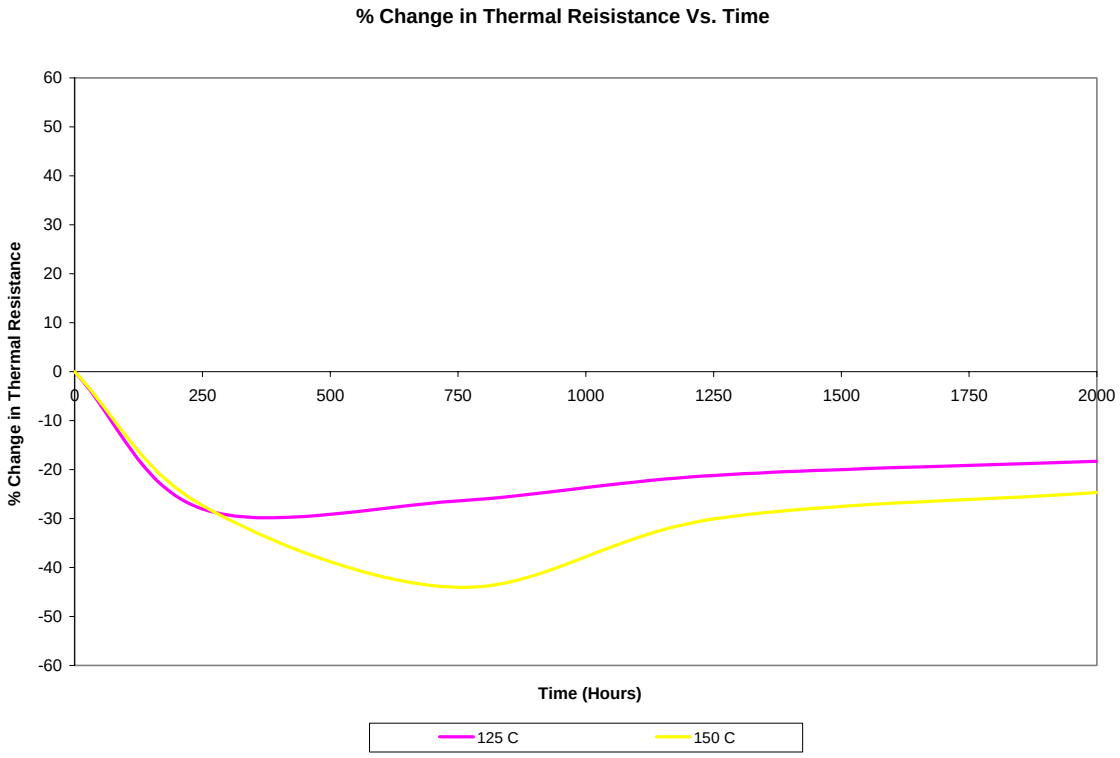
Lot used for reliability evaluation is 3-041609-01.

Section: 2 Thermal Bake

TEST #1 – ASTM D5470 in application – simulated by placing material between disks

- The thermal bake samples were tested for thermal resistance using a modified ASTM D5470 prior to bake conditions, every 250 hrs, and after bake conditions were completed (2000 hrs).
- During testing and bake conditions, the samples were maintained between two round aluminum disks measuring one square inch in surface area.
- During bake conditions (125°C and 150°C), clamps were used to hold a constant pressure on the sample.
- See Appendix: Picture 1-4

Results:



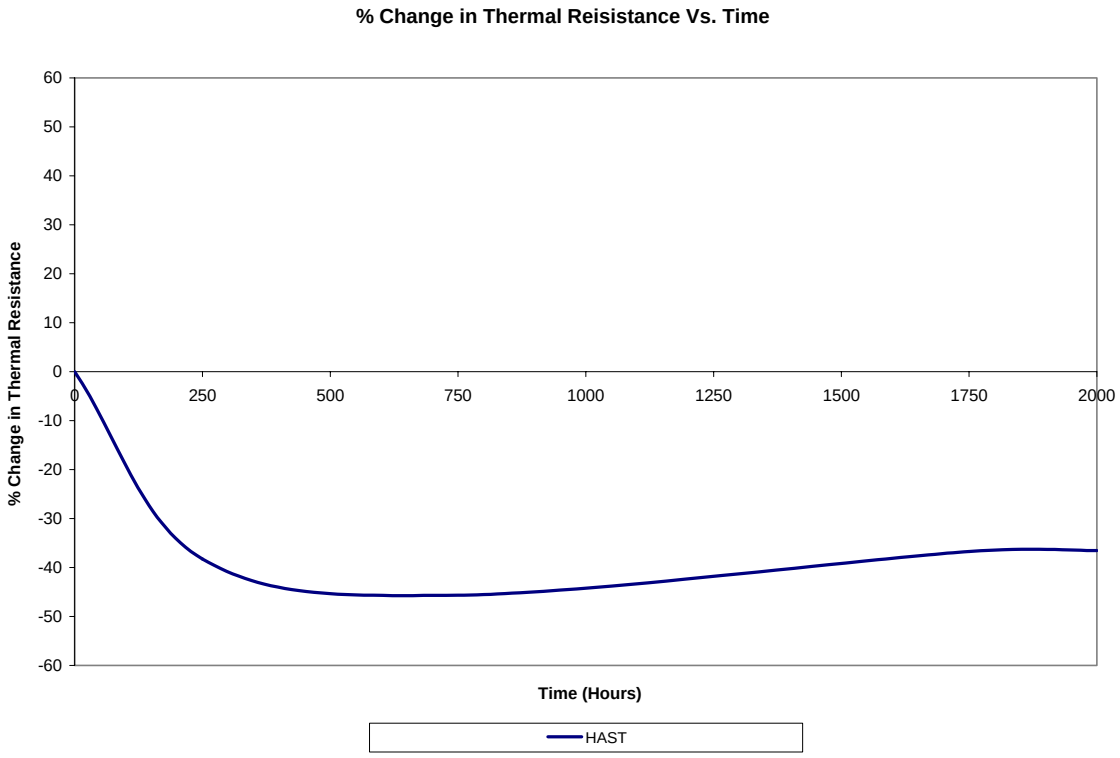
The thermal bake after 2000 hours at 125 and 150°C shows a decrease in thermal resistance resulting in better overall thermal performance.

Section 3: Thermal Bake in a HAST Chamber

TEST #1 – ASTM D5470 in application – simulated by placing material between disks

- The HAST samples were tested for thermal resistance using a modified ASTM D5470 prior to HAST conditions, every 250 hrs, and after HAST conditions were completed (2000 hrs).
- During testing and HAST conditions, the samples were maintained between two round aluminum disks measuring one square inch in surface area.
- During HAST conditions (85°C and 85% relative humidity in a HAST chamber), clamps were used to hold a constant pressure on the sample.
- See Appendix: Picture 1-4

Results:



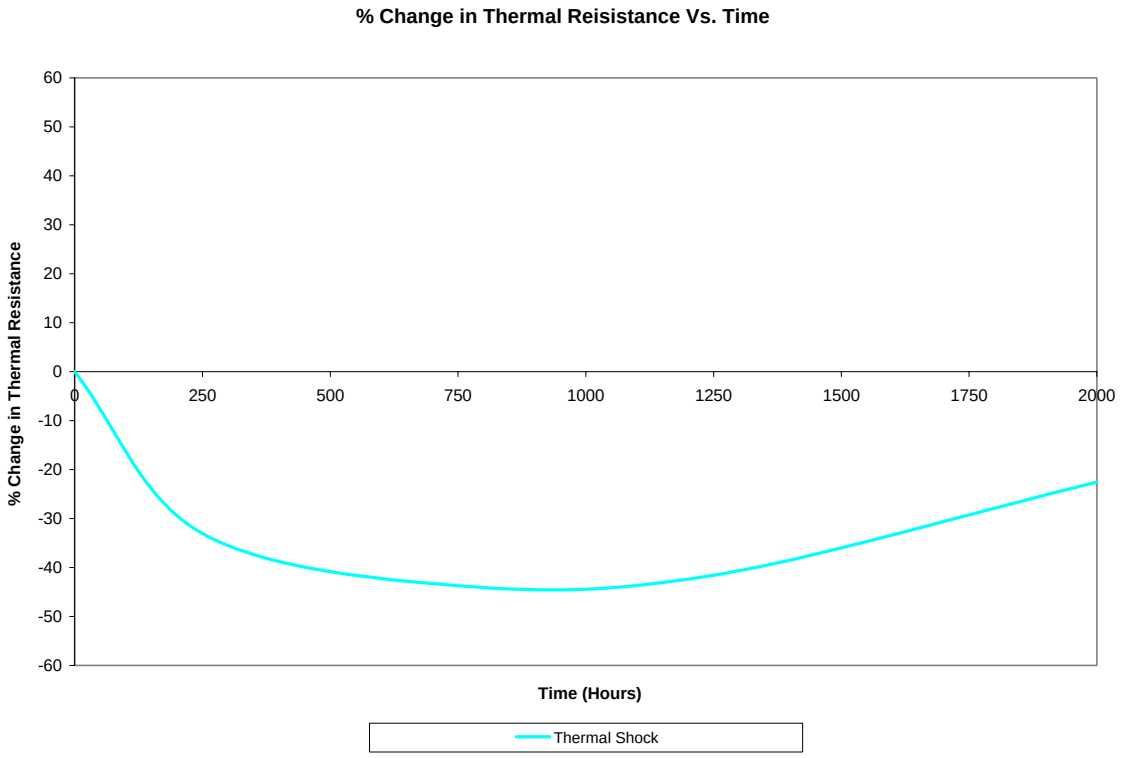
The thermal bake after 2000 hours in a HAST chamber shows a decrease in thermal resistance resulting in better overall thermal performance.

Section 4: Thermal Shock

TEST #1 – ASTM D5470 in application – simulated by placing material between disks

- The thermal shock samples were tested for thermal resistance using a modified ASTM D5470 prior to thermal shock conditions, every 250 hrs, and after thermal shock conditions were completed (2000 cycles).
- During testing and thermal shock conditions, the samples were maintained between two round aluminum disks measuring one square inch in surface area.
- During thermal shock conditions (-55°C to 125°C, 1 cycle per hour), clamps were used to hold a constant pressure on the sample.
- See Appendix: Picture 1-4

Results:



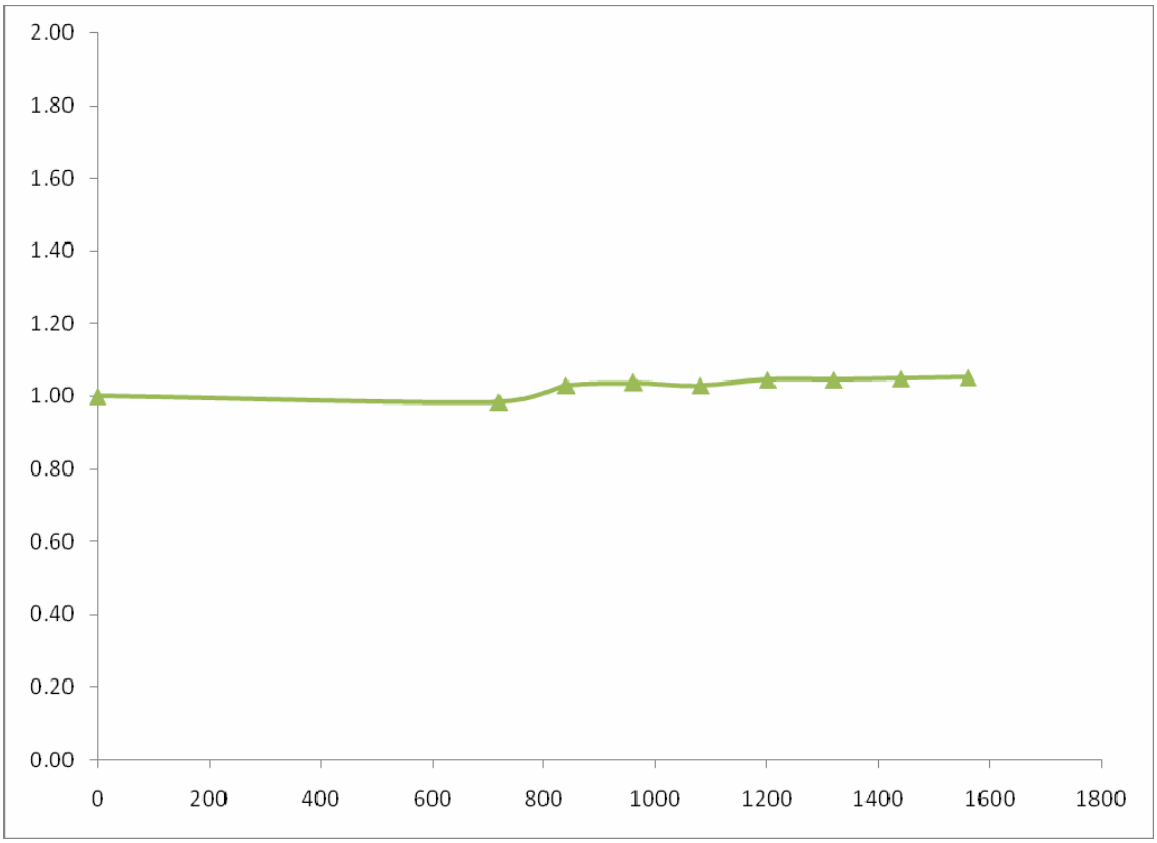
After 2000 hours in a thermal shock chamber (-55°C to 125°C) there is a decrease in thermal resistance resulting in better overall thermal performance.

Section: 5 Thermal Cycling

Test #1 – PC simulator

- The samples were thermally cycled using the Laird PC simulator.
- Test Condition was Room Temperature (25°C) to 125°C, one cycle every 12 minutes.
- The power was adjusted to cause the chip to reach 120°C.
- The tester was on/heating for 6 minutes, and off/cooling, for 6 minutes.
- Pressure was maintained at 20 psi.
- See Appendix: Picture 5
-

Results:



The TGrease 980 material shows a slight increase in thermal resistance after 1560 cycles (~5%).

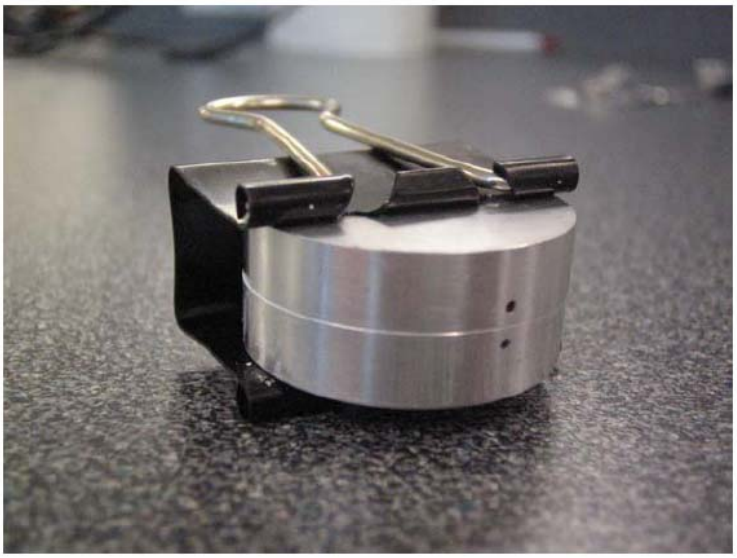
Section 6: Conclusion

In all tests except for power cycling, Tgrease 980 shows a reduction in thermal resistance from time zero testing. Power cycling shows a 5% increase which is still within the expected performance level for Tgrease 980 and is within the tester error of 10%. Under the conditions tested Tgrease 980 can be considered reliable.

Appendix

Picture #1 Aluminum disk used for reliability testing

Picture #2 Aluminum disks clamped with PCM between them



Picture #3 Close-up of the aluminum disks in the thermal tester

Picture #4 ASTM D5470 thermal resistance tester

Picture #5 – PC simulator cycling apparatus