

GORE™ POLARCHIP™ CP8000 THERMAL INTERFACE MATERIAL

Product Value Statement

GORE™ POLARCHIP™ CP8000 Thermal Interface Material (TIM) is engineered for applications requiring the highest conformability with the lowest applied stresses and low silicone content. It performs best when compressed 40%-80%.

Executive Summary

GORE™ POLARCHIP CP8000 Thermal Interface Material is ideal for gap-filling applications where the gap is large or variable due to tolerance stack-ups caused by irregular surfaces or the need to cool multiple components of varying heights. By using soft, conformable, highly compressible material, contact is ensured between heat sinks and hot devices, while minimizing the stress placed on the components of the printed circuit board. GORE™ POLARCHIP CP8000 is recommended for applications that require greater than 40% compression, and can be supplied in sheets, rolls, or precision die-cut parts. The die-cut parts are suitable for high volume automated assembly. Gore offers automated installation equipment solutions for thermal interface products.

Benefits

- Provides excellent heat dissipation between large or variable gaps
- Ensures contact with low stress on components (applications with >40% compression)
- Easy to handle and install
- Allows re-work of components & heat sinks – tacky on one side only

Material Characteristics

GORE™ POLARCHIP CP8000 Thermal Interface Material is a fluoro-polymer composite that consists of an expanded polytetrafluoroethylene (ePTFE) matrix filled with boron nitride (BN) particles. The low elastic modulus of the ePTFE matrix imparts softness, conformability, and a high level of compressibility to the composite. The unique use of ePTFE allows for a minimal silicone content, practically eliminating silicone migration issues. The reinforcing nature of the ePTFE matrix results in a composite that is physically robust, easy to handle, and does not require additional reinforcements (e.g., metal foils, fiberglass carriers, etc). The high thermal conductivity of the BN particles gives the composite its excellent thermal transport characteristics.

Material Properties

(Refer to chart on second/back page for detailed properties)

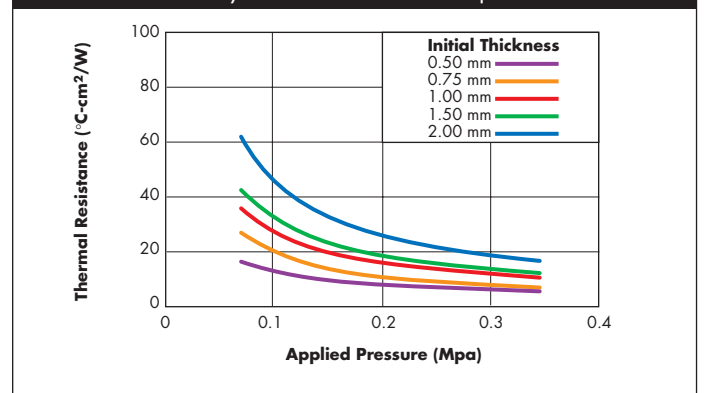
Thickness: 0.5mm (0.020 in), 0.75mm (0.030 in), 1.0mm (0.040 in), 1.5mm (0.060 in), 2.0mm (0.080 in), Other thicknesses available upon request

Flammability Rating: HB (UL94, File E130607)

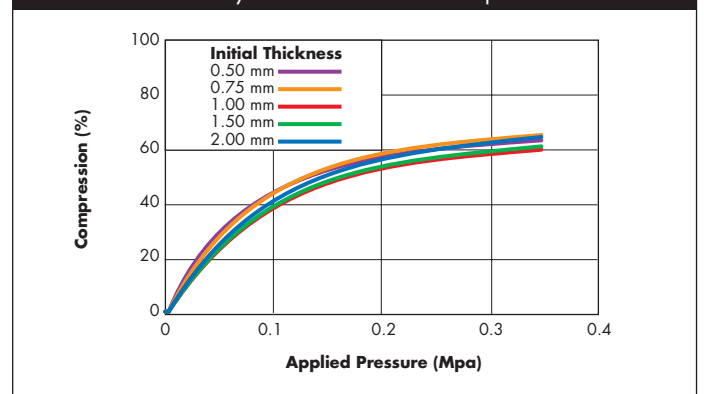
Silicone Extraction: Passes Bellcore Specifications per document TR-NWT-000930



Thermal Resistance vs. Pressure
CP8000 Thermally Conductive Interfaces per ASTM E1530



Compression vs. Pressure
CP8000 Thermally Conductive Interfaces per ASTM D575



POLARCHIP™ CP8000 Thermal Interface Material Properties

| Construction | | | | | | | |
|--|--|------------------|------------------|------------------|------------------|------------------|--|
| Property | Units | CP8000 | | | | | Test Method |
| Filler | — | Boron Nitride | | | | | — |
| Matrix | — | ePTFE | | | | | — |
| Color | — | White | | | | | — |
| Adhesive | — | 1 mil PSA | | | | | — |
| Thickness | mm (mils) | 0.5 (20) | 0.75 (30) | 1.0 (40) | 1.5 (60) | 2.0 (80) | ASTM D347, method C |
| Thermal | | | | | | | |
| Property | Units | CP8000 | | | | | Test Method |
| Thermal Impedance @ 0.07 Mpa (10 psi) | °C-cm ² /W (°C-in ² /W) | 16.1 (2.5) | 26.5 (4.1) | 34.8 (5.4) | 43.2 (6.7) | 61.9 (9.6) | ASTM E1530 |
| Thermal Impedance @ 0.17 Mpa (25 psi) | | 8.4 (1.3) | 12.9 (2.0) | 18.1 (2.8) | 20.6 (3.2) | 29.0 (4.5) | |
| Thermal Impedance @ 0.34 Mpa (50 psi) | | 5.2 (0.81) | 6.5 (1.0) | 9.7 (1.5) | 12.3 (1.9) | 16.1 (2.5) | |
| Thermal Conductivity @ 0.07 Mpa (10 psi) | W/m-K | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | |
| Thermal Conductivity @ 0.17 Mpa (25psi) | | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | |
| Thermal Conductivity @ 0.34 Mpa (50 psi) | | 0.74 | 0.74 | 0.74 | 0.74 | 0.74 | |
| Heat Capacity, 40 to 110°C | J/g | 1.24 | 1.22 | 1.25 | 1.12 | 1.23 | ASTM E 1269 |
| Flammability Rating | — | HB | | | | | UL94, file E 130607 |
| Mechanical | | | | | | | |
| Property | Units | CP8000 | | | | | Test Method |
| Compression @ 0.07 Mpa (10 psi) | % | 33.8 | 35.8 | 30.3 | 31.7 | 30.3 | ASTM D575, modified |
| Compression @ 0.17 Mpa (25 psi) | | 52.5 | 56.0 | 49.6 | 51.4 | 50.4 | |
| Compression @ 0.34 Mpa (50 psi) | | 60.6 | 65.3 | 61.9 | 61.3 | 60.9 | |
| Hardness | Shore A | 20 | 18 | 25 | 19 | 23 | ASTM D2240 |
| Specific Gravity | g/cm ³ | 0.37 | 0.37 | 0.39 | 0.36 | 0.51 | ASTM D792 |
| Electrical | | | | | | | |
| Property | Units | CP8000 | | | | | Test Method |
| Volume Resistivity | Ω-cm | 10 ¹⁴ | 10 ¹⁴ | 10 ¹⁴ | 10 ¹⁴ | 10 ¹⁴ | ASTM D257 |
| Dielectric Constant | — | 1.21 | 1.24 | 1.25 | 2.13 | 1.39 | ASTM D150 |
| Dielectric Breakdown Voltage | Volts/mil | 82 | 68 | 104 | 76 | 76 | ASTM D149 |
| Environmental | | | | | | | |
| Property | Units | CP8000 | | | | | Test Method |
| Silicone Extraction | Pass/Fail | Pass | Pass | Pass | Pass | Pass | Bellcore Specs TR-NWT-000930 sec 10.3 |
| Outgassing – Total Mass Loss | % | 0.76 | 0.60 | 0.58 | 0.58 | 0.57 | ASTM E595 |
| Outgassing – Collected Volatile Condensable Materials | | 0.12 | 0.09 | 0.08 | 0.08 | 0.09 | |
| Outgassing – Water Vapor Recovered | | 0.04 | 0.03 | 0.03 | 0.03 | 0.06 | |

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