



APTEK LABORATORIES, INC.

ISO 9001/ AS9100 Certified

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TECHNICAL DATA & INFORMATION

DAT-A-THERM™ 1303-B/C/B-SP®

Thermally conductive, low modulus, electrically insulating hybrid epoxy film adhesive

PRODUCT DESCRIPTION

DAT-A-THERM 1303-B/C/B-SP is a low modulus, flexible, void free, electrically insulating hybrid epoxy film adhesive designed to bond dissimilar components and substrates. This **B/C/B** system is designed to manage stresses developed from mismatches of thermal expansion coefficients during temperature cycling as well as to dissipate heat generated from components and circuitry.

DAT-A-THERM 1303-B/C/B-SP technology incorporates a partially-cured (B-staged) adhesive on both faces of a fully-cured (C-staged) ultra low modulus film. **DAT-A-THERM 1303-B/C/B-SP** film is a 100% solids, thermoset polymer, which will not outgas, while in place and is suitable for high vacuum environments. The film exhibits good reversion resistance and physical stability under long-term aging of high humidity and heat.

KEY FEATURES AND BENEFITS

- The -SP or small pattern version has a smaller diamond pattern of B-staged adhesive for smaller die-cut pieces
- Low modulus/high elongation for minimum stress buildup under components
- Low Tg - remains flexible to -70°C
- Exceeds NASA outgassing requirements for high vacuum environments
- Typical cured film thickness, 0.008" to 0.012". Custom thicknesses available.
- Low tack adhesive layer allows for easy placement and, if needed, repositioning on assemblies
- Reworkable to recover costly components and substrates
- Usable out-time after thaw is 8 hrs @ RT for improved handling convenience with no degradation of properties

HANDLING INFORMATION

DAT-A-THERM 1303-B/C/B-SP film adhesive is supplied in frozen sheet or die-cut form, and must be stored flat, in original factory supplied container at -40°C or below. Remove sheet or die-cut piece from the freezer, place the sheet on a flat surface, and peel off the red release film from both sides while still cold. During handling, keep the sheet as flat as possible and be careful to minimize bending of the material so that the B stage adhesive does not flake off. Lay the B/C/B gently on a piece of the red release film and allow to come to room temperature naturally – do not apply heat.

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For sheet stock, which needs to be cut by user either by hand, via die cutting, or laser cutting techniques:

Preparation of B/C/B sheets:

1. Allow B/C/B to warm to RT following the instructions stated above. This should easily occur within 5-7 minutes.
2. Place B/C/B sheet on a clean, hard, flat glass or steel surface.

Cutting method:

By Hand:

1. Gently place a straight edge or template directly on top of the B/C/B. Do not apply any excess pressure. Be careful not to disturb or flake off the B-stage adhesive.
2. Carefully cut to size using a razor knife with a new, sharp blade. Although some minor flaking of the B-stage adhesive may occur at the edge being cut, there still should be sufficient adhesive remaining to ensure a good bond.

By Die:

1. Ensure cutting surfaces on die blades are clean and sharp. Apply a slow, steady force on die stem, preferably with an arbor press, until blades penetrate cleanly through the B/C/B.
2. Carefully remove die cut piece from the die so as not to disturb or flake off the B-staged adhesive.

By Laser:

1. Only use a professional laser cutter, skilled in cutting polymer films, for this operation to ensure no damage occurs to the B/C/B during operation.

CURE SCHEDULE

1 hour @ 125°C

Notes:

1. For best results, maintain 5-15 psi pressure on parts/assemblies to be bonded during cure cycle. The more psi that is applied during cure, the better the B-staged adhesive will flow and the thermal conductivity and adhesive strength will be maximized.
2. Alternative cure schedule may be possible depending on application requirements

TYPICAL PROPERTIES

(values not to be used for specification purposes)

<u>CHARACTERISTICS</u>	<u>DAT-A-THERM 1303-B/C/B-SP</u>	<u>TEST METHOD</u>
Color	off-white	Visual
Specific gravity	1.82	ASTM D-1475
Shelf Life @ -40°C, factory sealed containers, months	6	
<u>CURED PHYSICAL PROPERTIES</u>	<u>DAT-A-THERM 1303-B/C/B-SP</u>	<u>TEST METHOD</u>
Al to Al Lap Shear, 10 mil bondline, 25°C, psi	420	ASTM D-1002
Tensile modulus, 0.005", psi		
@ 55°C	600	ASTM D-638
@ 25°C	750	
@ -55°C	1700	
Glass Transition Temp., °C	-70	ASTM E 831-86

Thermal coefficient of expansion in/in/°C	alpha 1 alpha 2	40 x 10 ⁻⁶ 160 x 10 ⁻⁶	ASTM E 831-86
Moisture absorption, %		0.15	ASTM D-570
Thermal conductivity, W/m°K		0.9	ASTM C-518 ASTM E-1530
Outgassing at 10 ⁻⁶ Torr			
TML, %		0.45	ASTM E-595
CVCM, %		0.03	

<u>CURED ELECTRICAL PROPERTIES</u>	<u>DAT-A-THERM 1303-B/C/B-SP</u>	<u>TEST METHOD</u>
Volume resistivity, @ 25°C, ohm-cm	7.0 x 10 ¹⁴	ASTM D-257
Dissipation Factor (D)/Dielectric Constant (K) @ 25°C, 1 KHz	0.03/5.8	ASTM D-150
Dielectric strength, 0.005", volts/mil	1000	ASTM D-149

SAFETY AND FIRST AID

DAT-A-THERM 1303-B/C/B-SP is a mineral filled polymer system which is safe to handle as it is packaged between release films and exposure should be minimal. Use clear plastic or rubber gloves when handling thawed film. Avoid contact with skin and eyes and use in a well-ventilated area and avoid breathing vapors. In case of eye contact, flush with fresh clean water for at least 15 minutes; for skin contact, wash thoroughly with soap and water. If swallowed, drink at least one pint water and call a physician. Refer to Material Safety Data Sheet for more details.

Revised: 9/9/26 – mjb

Issued: 1/29/03

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