THERM-A-FORM™ Form-In-Place Thermal Interface Compounds and Encapsulants

MATERIAL DESCRIPTIONS

Chomerics' THERM-A-FORM materials are used for heat transfer applications in electronic component cooling. These form-in-place, flexible elastomer compounds minimize stress on components. They are available in a range of kit sizes for both manual and pneumatic dispensing.

Each THERM-A-FORM material is supplied as liquid reactive components. In each, Part A is white, while Part B is pigmented for identification purposes and indicating whether mixing is complete. All cure at room temperature, and cure cycles may be accelerated with heat.

THERM-A-FORM T642 Silicone Encapsulant

This material is ideal for various component-level heat transfer applications. Part A (white) and B (blue) combine in a 10:1 ratio to produce a flexible, low modulus rubber.

THERM-A-FORM T644/T644G Low Modulus Thermal Interface Compound

This soft, very low modulus material is formulated for heat transfer applications involving fragile electronic components. The T644G material has the same properties as T644 but includes 0.007" glass beads for electrical isolation. Part A (white) and B (red) combine in a 1:1 ratio.

THERM-A-FORM T646 Commercial Grade Thermal Interface Compound

This material is suitable for transferring heat from hot components to heat sinks, PC boards, metal enclosures and chassis. It offers an excellent blend of high thermal conductivity, low cost and ease of use. Part A (white) and B (yellow) combine in a 1:1 ratio.

PACKAGING

THERM-A-FORM T642 material is offered in 35cc, 177cc, 250cc and 330cc kit sizes. THERM-A-FORM T644 and T646 materials are offered in 45cc, 177cc, 200cc, and 330cc kit sizes.

Cartridge Systems

The 35cc, 45cc, 200cc and 250cc kits are handheld dispensing systems, with a twin-barrel cartridge housing Parts A and B, and a plastic static mixer that attaches to the end of the cartridge.

These systems are designed for use with handheld manual or pneumatic applicator guns for prototyping or small production runs.

Tube Systems

The 177cc and 330cc kits are supplied in 6 oz. and 12 oz. Semco tubes, and are designed for production dispensing using metered mixing equipment.

TYPICAL PROPERTIES AND CHARACTERISTICS

Property	T642	T644/T644G	T646	Test Method
Binder	Silicone	Silicone	Silicone	
Filler	Boron Nitride	Boron Nitride	Aluminum Oxide	
Color	Blue	Red	Yellow	Visual
Mix Ratio, Part A:B (by weight or volume)	10:1	1:1	1:1	
Pot Life, hours @ 20°C	1	6	5	
Cure Cycles	3 minutes @ 150°C 30 minutes @ 70°C 48 hours @ 23°C	3 minutes @ 150°C 60 minutes @ 60°C 48 hours @ 23°C	3 minutes @ 150°C 60 minutes @ 60°C 48 hours @ 23°C	
Solvent Extractables, %	1-2	15	8.5	TR-NWT-000930 Sec 10.3
Thermal Conductivity, W/m-K	1.2	1.2	0.9	ASTM D5470
Dielectric Strength, Vac/mil	500	500	250	ASTM D149
Volume Resistivity, ohm-cm	1×10^{13}	1×10^{13}	1×10^{15}	ASTM D257
Hardness (Shore A)	70	15	50	ASTM D2240
Viscosity, poise	2500	3000	>5000	ASTM D2196
Outgassing[1] % TML % CVCM	 0.32 0.21	 0.39 0.29	 0.17 0.10	ASTM E595-90
Specific Gravity	1.5	1.45	2.45	ASTM D792
Shelf Life	3 months @ 20°C	3 months @ 20°C	3 months @ 20°C	
Continuous Use Temperature	–50°C to +150°C	–50°C to +150°C	–50°C to +150°C	

[1] Material cured 24 hours at 150°C

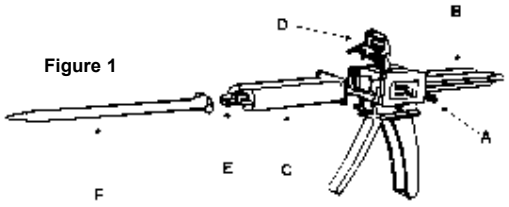
APPLICATION INSTRUCTIONS

35cc and 45cc Kits *(See Figure 1)*

Push safety latch (A) upward. Insert the pushrod (B) into the applicator with the pushrod gear teeth facing downward. Insert the cartridge (C) into the slots on top of the applicator. Push the retainer clamp (D) down firmly to lock the cartridge in place. Remove the cartridge cap (E) with a 1/4 turn counter-clockwise.

Attach the static mixer (F) to the cartridge. (For the 10:1 cartridge, make certain that the small notch on the mixer tube face is toward the large barrel containing Part A.) Turn the mixer tube 1/4 turn clockwise to lock it in place. Cut the tip of the mixing nozzle to obtain the desired bead size, or attach a needle with the Luer adapter. After use, discard the static mixer and replace the cap on any remaining material.

Figure 1



200cc and 250cc Kits

This procedure is similar to that used for the 35cc and 45cc kits, except that a pneumatic applicator is used. Withdraw the pushrods into the applicator gun. Set the air pressure at 60 psi. Insert the cartridge into the slots at the end of the applicator. Remove the end-plug by turning the retaining nut counter-clockwise. Attach the static mixer using the retaining nut. Cut the tip of the mixing nozzle to obtain the desired bead size, or attach a needle with the Luer® adapter. After use, discard the static mixer and replace the cap on any remaining material.

177cc and 330cc Kits

Follow the instructions for the appropriate meter mix equipment.

THERM-A-FORM COMPOUNDS Approx. Cure Times*	
25°C	48 hours
50°C	120 minutes
75°C	30 minutes
100°C	10 minutes
125°C	5 minutes
150°C	3 minutes

*Time at temperature

CURE

THERM-A-FORM materials cure at room temperature in 24 to 48 hours. The following table lists approximate cure times for different temperatures. Thermal mass should be considered when selecting the final cure temperature profile.

CURE INHIBITION

Certain chemicals can inhibit the cure of THERM-A-FORM materials, including:

- Organotin and certain metallic compounds
- Silicone rubber cured with organotin catalysts
- Sulfur, polysulfides, polysulfones or materials containing sulfur, such as papers, masking tape, etc.
- Amines, some urethanes, amides and amine-containing materials
- Some unsaturated hydrocarbon plasticizers

A small-scale test can be easily performed to determine compatibility of the THERM-A-FORM elastomer and the material in question. Place a small amount of mixed elastomer on the material being tested and place in an oven at 100°C for 15 minutes. Remove from the oven and, after cooling, examine the material. The presence of a liquid or uncured layer at the interface indicates cure inhibition.

ORDERING INFORMATION

Size	Product	Part Number		Kit Contents
35cc	T642	65-00-T642-0035	Cartridge Total material	10:1 dual element 53 grams min.
177cc	T642	65-00-T642-0177	Cartridges Total material	two 6 oz. Semco cartridges 248 grams min.
250cc	T642	65-00-T642-0250	Cartridge Total material	10:1 dual element 372 grams min.
330cc	T642	65-00-T642-0330	Cartridges Total material	12 oz Semco cartridge and 6 oz. Semco cartridge 495 grams min.
45cc	T644 T646 T644G	65-00-T644-0045 65-00-T646-0045 65-00-T644G-0045	Cartridge Total material	1:1 dual element 68 grams min. (T644) 115 grams min. (T646)
177cc	T644 T646 T644G	65-00-T644-0177 65-00-T646-0177 65-00-T644G-0177	Cartridges Total material	two 6 oz. Semco cartridges 452 grams min. (T644) 763 grams min. (T646)
200cc	T644 T646 T644G	65-00-T644-0200 65-00-T646-0200 65-00-T644G-0200	Cartridge Total material	1:1 dual element 300 grams min. (T644) 507 grams min. (T646)
330cc	T644 T646 T644G	65-00-T644-0330 65-00-T646-0330 65-00-T644G-0330	Cartridge Total material	two 12 oz. Semco cartridges 992 grams min. (T644) 1676 grams min. (T646)

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