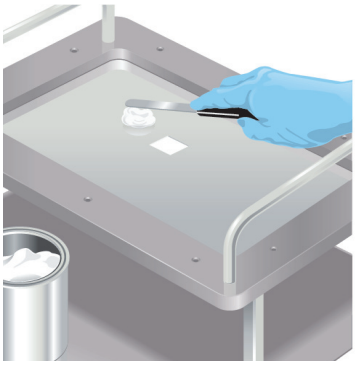
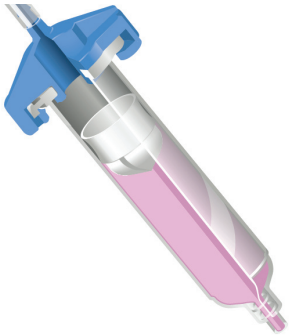


aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
electronic materials



Thermal Interface Material Dispensing Guide

For Thermally Conductive GELs, Cure-in-Place Potting Compounds and Greases

Parker Chomerics

ENGINEERING YOUR SUCCESS.

Customer Responsibility and Offer of Sale Statement

CUSTOMER RESPONSIBILITY

WARNING – USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries, and authorized distributors provide product or system options for further investigation by users having technical expertise.
The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety, and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

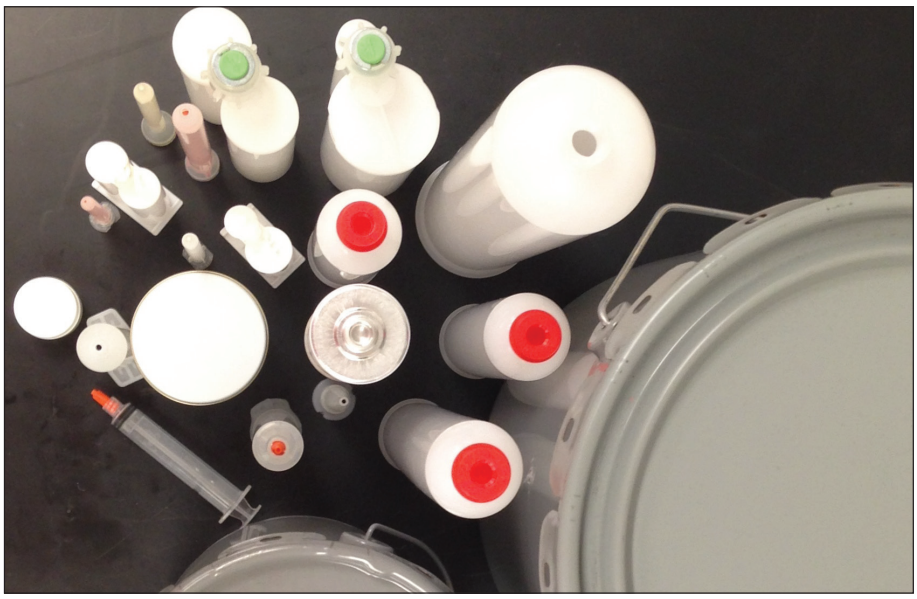
OFFER OF SALE

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the detailed "Offer of Sale" elsewhere in this document or available at www.chomerics.com or www.parker.com.

Thermal Interface Material Dispensing Guide

Parker Chomerics thermally conductive dispensable products are an ideal solution for today's electronic packages. Thermally conductive, dipensible materials have the ability to cover a variety of gaps and form complex geometries. This ability to conform provides reduced thermal contact resistances and thus reduces the temperature and increases efficiency of the electronic application, while being low closure force. When using dispensable products, factors such as pump equipment, mating surfaces, tolerance stack up, closure force, and physical application of the material have to be considered.

There are many options for dispensing equipment, ranging from manual syringes, to high volume automated dispensing systems. The choice of the proper equipment will depend on several factors, including volume, labor/equipment cost, precision requirements, and material type to be dispensed.

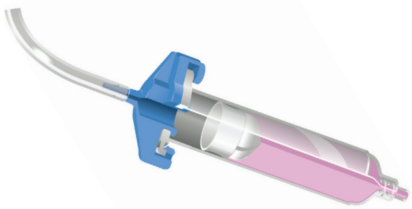


When choosing the appropriate dispensing equipment, designers should keep in mind how the equipment may interact with the material. The material and the delivery system need to be compatible to optimize equipment life and maintain material properties.

To achieve high thermal conductivity, these materials are highly filled with ceramic particles. Due to this high loading, the thermal compounds have higher viscosity and may be abrasive. Therefore, they will dispense differently than common low viscosity grease or adhesive.

Once the proper equipment is chosen, certain factors should be considered to increase the quality and through-put of the material. These factors may include needle/nozzle height, dispensing pattern, dispensing speed, needle diameter, substrate surface finish etc.

The intent of this guide is to aid in the appropriate choice of Chomeric's thermally conductive dispensable materials, equipment and dispense process.



Parker Chomerics

Overview of Dispensable Materials

THERM-A-GAP™ GELS

T630, T630G, T635, T636, T652, GEL8010, GEL30, & GEL30G

THERM-A-GAP™ GELs are high performance, fully cured, dispensable, thermal materials. Their one-component, cross-linked structure, provides superior performance and long-term thermal stability with very low closure forces.
These Gels are highly conformable and provide low thermal impedance like greases, but are designed to overcome the pump-out and dry-out issues associated with grease. Therm-A-Gap Gels are designed to be dispensed in applications requiring low compression forces and minimal thermal resistance for maximum thermal performance. They are ideal for filling variable thickness gaps in a single application.

Features / Benefits

Fully Cured

- Requires no refrigeration, mixing, or additional curing
- Proven long-term reliability and superior performance
- No settling occurs in storage

Highly Conformable At Low Pressures

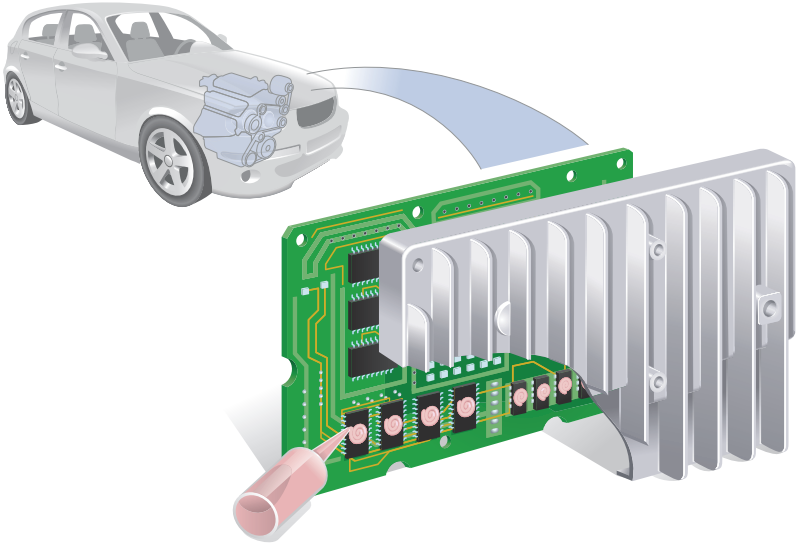
- Ideal for multiple thickness gaps under one common heat sink
- Applies very low stress on components, which makes it ideal for delicate applications
- Allows for design flexibility compared to thermal pads

One Component Dispensable

- Eliminates hand assembly
- Decreases installation cost
- Eliminates multiple pad part sizes/ numbers

Excellent Surface Wetting

- Excellent for maintaining contact through thermal cycling



Typical Applications

- Automotive electronic control units (ECUs): Engine, Transmission, and Braking/Traction controls
- Power conversion equipment
- Power supplies and uninterruptable power supplies
- Power semiconductors
- MOSFET arrays with common heat sinks
- Televisions and consumer electronics

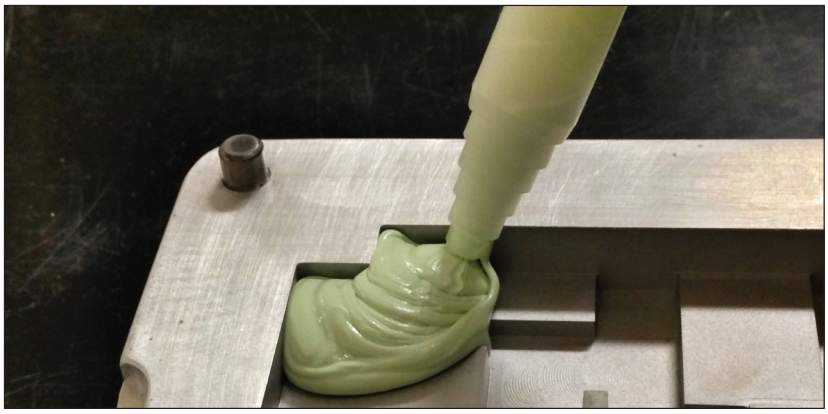
Storage Conditions

Materials should be stored at 50-90°F at 50% relative humidity.

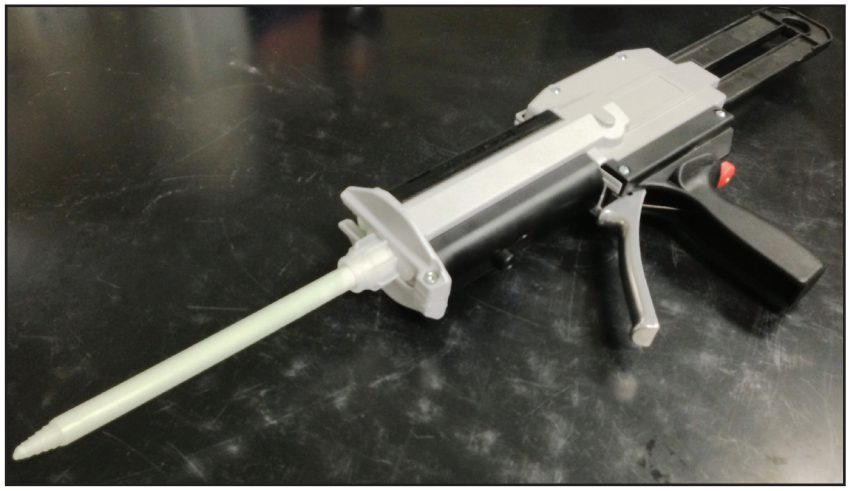
Overview of Dispensable Materials

THERM-A-FORM™ CURE-IN-PLACE COMPOUNDS

T642, T644, T646, T647, 1641, & 1642



THERM-A-FORM™ (Cure-In-Place) compounds are thermally conductive silicone elastomer products are dispensable compounds designed for heat transfer without excessive compressive force in electronics cooling applications.
These versatile RTV (room temperature vulcanizing) liquid materials can be dispensed and then cured into complex geometries for cooling of multi-height components on a PCB without the expense of a molded sheet. Each compound is available in ready-to-use cartridge systems, eliminating weighing, mixing, and degassing procedures.



Features and Benefits

Cure-In-Place Dispensable Compound

- Filling, potting, overfill, under fill, sealing, and encapsulating
- Flows around complex parts
- Ideal for multiple thickness gaps under one common heat sink
- Can cure at elevated heat cycle or at room temperature
- Localized encapsulating of components
- Ceramic particles act as natural standoffs for electrical isolation
- Room temperature and elevated cure available

Conformable (Low Modulus)

- Mold to complex irregular shapes without excessive force on components
- Insulates against shock and vibration

Typical Applications

- Power conversion equipment
- Power supplies and uninterruptablepower supplies
- LED Modules & Power Drivers
- Telecom Base Stations

Storage Conditions

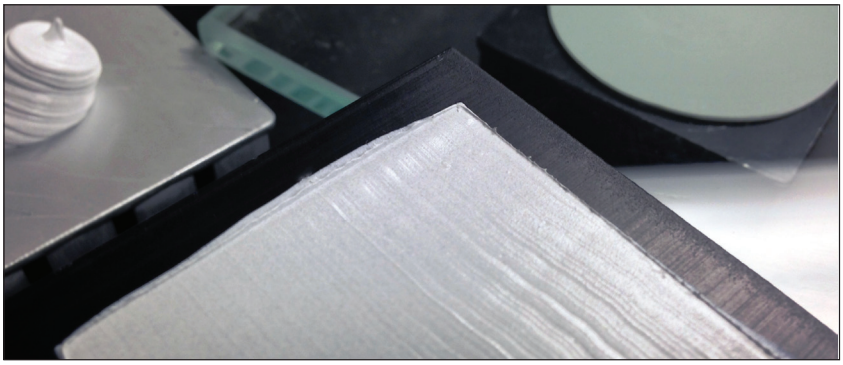
To maintain uniformity tubes/cartridges should be stored horizontally. Remixing prior to dispensing is not advised, unless the material can be vacuum degassed, to remove any air bubbles. They should be stored at 50-90°F at 50% relative humidity.

Parker Chomerics

Overview of Dispensable Materials

Other Dispensable Thermally Conductive Compounds

T650, T660, & T670



The materials that fall in to this category are formulated using viscous silicone oil and are loaded with thermally conductive fillers. They are excellent for conforming to surface micro-voids created by machining/casting to reduce thermal impedance.

Greases and other dispensable thermal compounds have excellent surface wetting characteristics and flow easily to fill up voids at the interfaces resulting in low thermal impedance even at low pressure. They are ideal materials for stenciling and screening similar to the method depicted below.

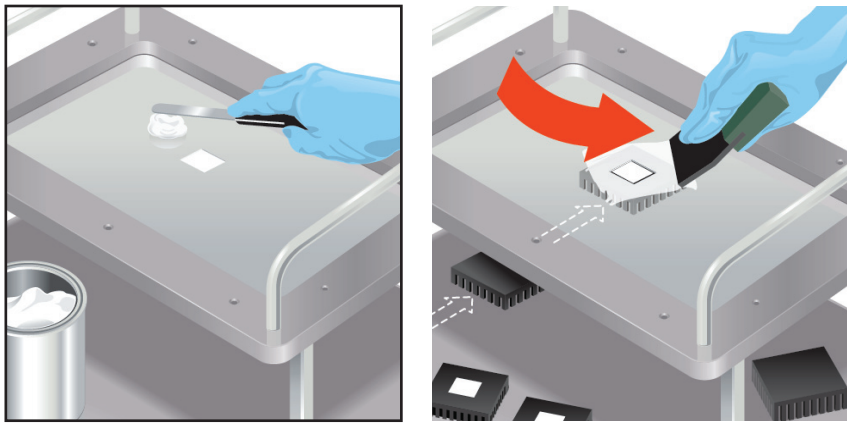


Figure 1: Stenciling Typical application method is to stencil the compound on to the chip or heat-sink. Application patterns can vary depending on the area of coverage. The image above depicts a typical square grease pattern being applied onto a heat-sink with a squeegee or spatula.

Features and Benefits

Highly Conformable

- Low thermal impedance
- Deflects under minimal compressive forces
- Great surface wetting
- Excellent ability to fill micro-voids

One Component

- Excellent for screening and stenciling
- Requires no cure cycle

Typical Applications

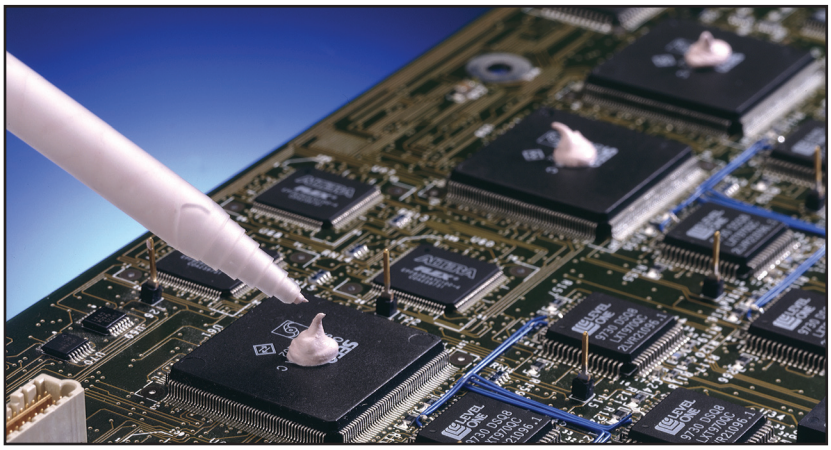
- LED Modules
- Microprocessors (Mobile Servers & Desktops)
- Memory Modules
- DC/DC Converters
- Power Semiconductors
- Telecom Base Stations

Storage Conditions

Material may settle overtime in storage. Best practice is to remix the material prior to use. Materials should be stored at 50-90°F at 50% relative humidity.

Material Selection

Choosing a Thermal Interface Material (TIM) and Dispensing Method



When designing in a dispensable TIM, there are several considerations to keep in mind when determining the appropriate product. The main purpose of the material is to conduct heat, but with a dispensable TIM there is more to the selection process than simply evaluating thermal conductivities.

Temperature and Environment

To choose the appropriate material for the application, there has to be an understanding of the heat generation that must be dissipated, as well as environmental conditions and limits. Occasionally there are substrates that limit the temperatures that be used for curing a CIP. Other applications (automotive, under the hood) may present high vibration exposure or extreme temperature cycling that would restrict the type of material that can be used. For example, a GEL material may be selected over a CIP material in applications with extreme thermal shock and vibration because of their inherent tack and elasticity.

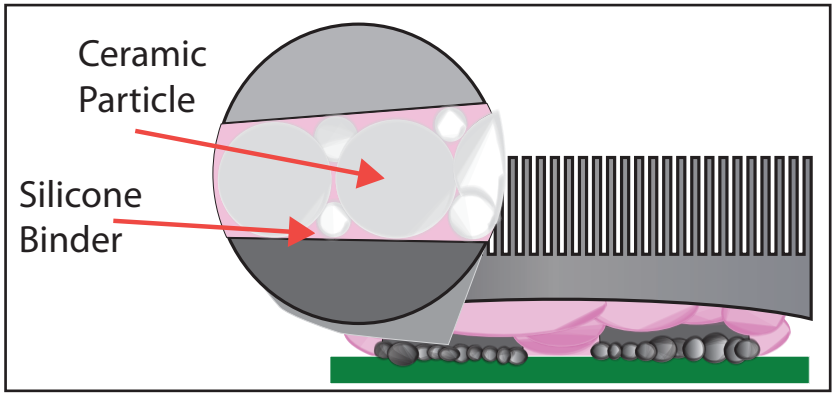


Figure 2: Electrical Isolation Typical Ceramic particles shown as natural mechanical stand-offs for electrical isolation

Mechanical

The nominal gap and expected variation in gap will dictate the amount, or thickness of TIM material required. Forces generated by expansion/contraction or vibration, coupled material hardness, will result in stress on components. Selection of a soft, conformable material with appropriate thickness will minimize potential damage to critical components.

Dielectric Strength

Chomerics thermal interface materials are comprised of resins and ceramic fillers that are inherently electrically isolating. The largest filler particles will dictate the minimum gap that can be achieved to prevent direct contact of electrical component to heat-spreader.

Package Size

Chomerics offers a variety of packaging formats and sizes. Selection of the appropriate format will be a function of throughput, shot size, and expected change over-time as well as compatibility with dispensing equipment. Custom packaging is available upon request.

Parker Chomerics

Equipment Types

Table 1: Low Volume Dispensing Methods

	Jar or Container	Manual Hand Dispensing		Cartridge Caulking Gun			Shot Size Controllers	
		Single Component Syringe	MixPac™ with Static Mixer	Manual	Battery Powered	Air or Pneumatic	Pressure /Time	Positive Displacement
Features & Benefits	No Capital, Immediate Installations, Small & Portable, Versatile with Tip Attachment, No Purging Required					No Capital, Small & Portable, Ergonomically Preferred	Repeatable Shot Size, No Purging, Versatile Tip Geometry	Precision Shot Size Control, No Purging, Versatile Tip Geometry, Improved Bead Termination
Operator Responsibility	Dispensed Size, Cycle-Time, Location & Shape	Dispensed Size, Cycle-Time, Pressure, Location & Shape		Dispensed Size, Cycle-Time, Pressure, Location & Shape	Dispensed Size, Cycle-Time, Location & Shape	Dispensed Size, Location & Shape	Location & Shape	Location & Shape
Variability in Dispensed Part	Size, Shape, Rate & Location			Size, Shape, Rate & Location	Size, Shape & Location	Size, Shape & Location	Location & Shape	Location & Shape
Chomerics Material Package Description	1.4cc & 120cc (1Pint with vial)	1-10cc Syringe	10:1 35-250cc 1:1 45-200cc Cartridge with Static Mixer	300cc Aluminum Cartridge		30-360cc Cartridge	30-360cc Cartridge	30-360cc Cartridge
Material Cost	LARGER BULK CONTAINERS ARE THE MOST ECONOMICAL PRICE PER CC							
Common Equipment Vendors	None	None	Sulzer MixPac	Albion, Bergdahl SEMCO	Albion	Albion & Bergdahl SEMCO	Nordson EFD, Bergdahl SEMCO, & Fisnar	Fishman, PVA, Nordson EFD
Equipment Description	None		B System (35cc & 45cc Sulzer)	B26 (Albion)	846-1E (Albion)	846-1A (Albion)	Performus III, Ultra 2400 Series, Ultra 1400 Series, & Ultra 870 Series (Nordson EFD)	TBD
							DSP501N & JB1113N (Fisnar)	TBD
			F System (200cc & 250cc Sulzer)	850 (Bergdahl SEMCO)	TBD	250-A & 550 (Bergdahl SEMCO)	250-B (Bergdahl SEMCO)	TBD
							TBD	TBD
Comments	For Stenciling use a Die-Cut Mylar that is thicker than the minimum bond-line thickness	Hand held syringe	Manual dispense system with appropriate mix-ratio (material dependent)	Manual caulking gun may dispense faster depending on the operator	Battery powered caulking gun may dispense faster depending on the operator	Air powered caulking gun may dispense faster depending on the operator	Table top unit, that can handle high viscosity compounds and regulates pressure and time. Flow rate is measured at 90psi directly out of the cartridge	Table top unit, that can handle high viscosity compounds and regulates displacement.

NOTE: *Chomerics does not officially endorse any of the equipment above or supply it. For equipment techincal support please contact the vendors listed.*

Parker Chomerics

Equipment Types

Table 2: High Volume Dispensing Methods

	Bench Top Dispensing Systems	High Volume Dispensing Module	
		Cartridge Pumping and Robotic Dispense System	Pail Pump and Transport System
Features & Benefits	Repeatable Shot Size and Shape, Programmable XYZ Direction and Speed, Continuous Dispensing, Low Capital Investments	Fastest Cycle Type, Lowest Material Cost, Visual Inspection Systems, Fully Automated System, Best Control and Yield, Continuous Dispensing, Repeatability In Shot Size & Shape	Fastest Cycle Type, Lowest Material Cost, Visual Inspection Systems, Fully Automated System, Best Control and Yield, Continuous Dispensing, Repeatability In Shot Size & Shape, Multi-process step
Operator Responsibility (Post Programing and General System)	Seating application under dispensing head	Purging dispense system between materials	Purging dispense system between materials
Variability in Dispensed Part	None	None	None
Chomerics Material Package Description	30-360cc Cartridge	6oz. (180cc), 8oz.(240cc), 12oz. (360cc), 20oz(610cc), & 32oz.(953cc) Cartridge	1-5 Gallon Pail
Material Cost	LARGER BULK CONTAINERS ARE THE MOST ECONOMICAL PRICE PER CC		
Common Equipment Vendors	Camelot, Fisnar and Nordson EFD	Please Contact Local Territory Sales Manager Or Applications EngineeringFor High Volume Equipment Recomendations	
Equipment Description	F4200N (Fisnar)		
	I+J4100LF & DSP501A-LF (Fisnar)		
Comments	Programmable table top unit that is compatible with available packaging.	Pump dispenses directly out of the cartridge to dispensing value. Gear pumps and soft metal component pumps are not recommended. Short hoses with minimum ID, and limited bends and elbows are ideal to minimize shear.	Pump dispenses directly out of the pail to dispensing value. Conductive filler is abrasive. Gear pumps and soft metal component pumps are not recommended. Short hoses with minimum ID, and limited bends and elbows are ideal to minimize shear.

NOTE: *Chomerics does not officially endorse any of the equipment above or supply it. For equipment techincal support please contact the vendors listed*

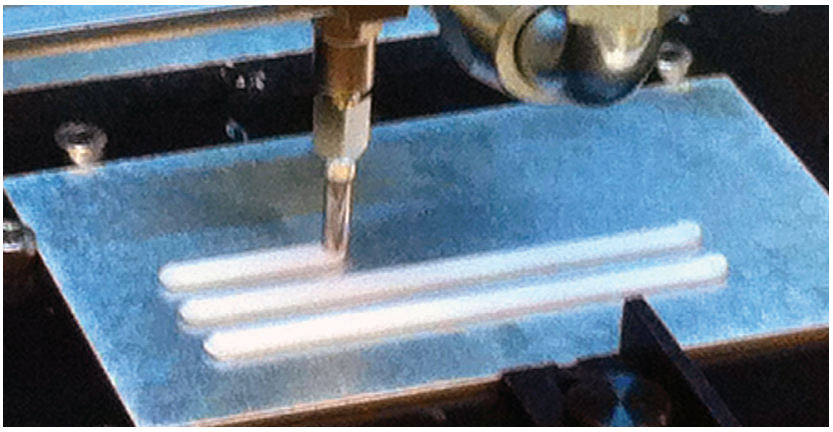
Parker Chomerics

Technical Parameter

High Volume Equipment Considerations

High volume applications will require an appropriate dispensing system designed for larger package formats (i.e. SEMCO cartridges and pails). The proper equipment choice will be a function of geometry, throughput requirements, material type, and package. Material selection should be defined prior to selecting equipment to optimize the material performance and the long-term equipment maintenance. Most thermal materials contain high concentrations of ceramic filler to maximize the thermal performance, so they dispense differently than an unfilled polymer or grease.

GELs are truly unique materials, in that they are fully cured thermally conductive polymers that can be extruded. The advantage in using thermally conductive GELs is that they do not require any mixing or curing once they are dispensed. The key to dispensing a GEL in high volume is to maintain the material's integrity as it is being dispensed by minimizing the tubing lengths, maximizing the tubing's inside diameter, and reducing the number of elbows (i.e. bends or angular connections). Using a larger-orifice needle tip reduces the amount of shear the on the material (please refer to "Technical Parameters: Dispense Patterns & Process Considerations").



To successfully dispense GELs with minimal impact to physical properties, simple ram/piston pump systems with adequate force capability have proven most reliable. Reciprocating pumps, gear pumps, or other complex pumping designs impart excessive stress on the material. Pump systems that have high a degree of mechanical interaction with the material may increase maintenance needs due to the high concentrations of thermally conductive and sometimes abrasive fillers.

The valve that dispenses, or controls, the amount of material dispensed needs to be constructed of wear-resistant components to endure a maximum number of cycles. The most successful valves use a progressive cavity (i.e. displacement type option), and are geometrically simple. There are other features that are available in valves, including "snuff-back design" that can aid in the termination of the dispensed bead, as well as built-in shot-size calibration/control.

Two-Component CIP (Cure-In-Place) materials require similar equipment design as GELs, but must also take into consideration mixing, metering, and curing. The CIP materials also require maximizing the tubing's inside diameter while minimizing tube lengths and number of elbows used (i.e. bends or angular connections). Mixing must be done carefully, without introducing any air, or be done under vacuum (so as not to create air voids). The easiest method of blending the two components is to use a static mixer. Metering, or ensuring the proper amount of each side blended, must be accurate to maintain the materials end properties.

Technical Parameters

Part Considerations

Once a TIM has been selected and the dispensing system has been defined, the next step is to analyze the part(s) to ensure that the correct volume of TIM is delivered to the required location in the correct shape.

As a starting point, use the following tasks to guide part analysis:

- Define number of target locations
- Determine whether TIM will be dispensed on the component side or heat sink side
- Consider all operations that occur post dispense and prior to final assembly that may affect form, placement, cleanliness, position, etc.
- Define dispense technique (this is a function of TIM type, geometry, etc). Examples include screening, potting, injection, and direct dispense to target

Figure 3: Multiple Location Casting

- Consider any physical obstructions that the dispense head will have to navigate around
- Calculate shot size per dispense location (function of the area of coverage, gap(s), and shape
- Assess the surfaces that will be in contact with the TIM: composition, roughness, and geometric features
- Address cleanliness for proper wetting and thermal performance
- Assess the special conditions that the TIM will be subject to (see section on Special Considerations):
  - Orientation, Vibration, Mechanical Stresses, and Temperature Extremes
  - Cure conditions when high temperature cure is required for a CIP, with low melt materials in proximity
  - Transporting of part to multiple locations i.e. Packaging, climate, protection, etc

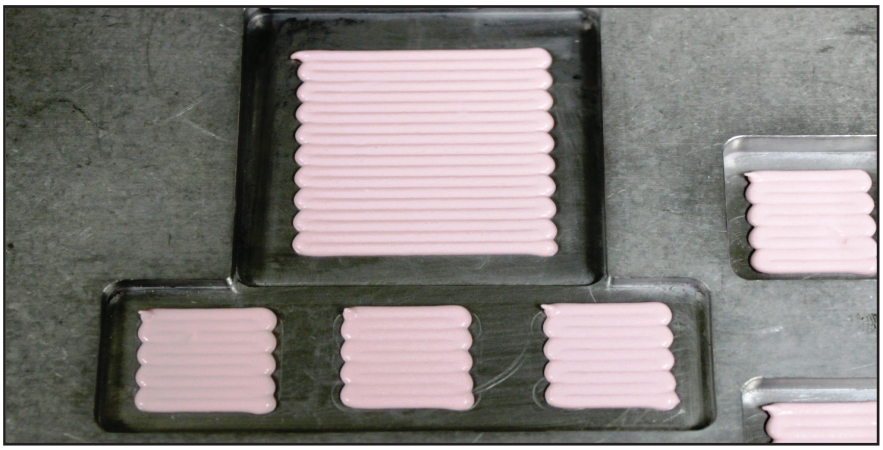


Figure 4: Multiple Location Casting

Table 3: *A surface roughness of N8 or rougher is recommended*

Surface Roughness Values		
Grade Number	Micro-meter	Micro inches
N8	3.2	125
N9	6.3	250

Technical Parameters

Dispense Patterns & Process Considerations

To maximize thermal performance, the TIM must contact entire target area on both the component and heat sink surfaces without air entrapment. In order to achieve this, a proper dispense pattern is critical.

Taking part considerations into account (as discussed on the previous page), the next process design task is to specify the dispensed material pattern. Consider the following parameters:

- Volume required: a function of the nominal gap, tolerances, and geometries
- Shape of bead required to "wet out" the entire targeted area
- Shot location and registration
- Elimination of potential trapped air

Also consider a means of process verification:

- Visual inspection (if possible)
- Automatic/Integrated optical verification
- Functional tests (measurement of critical junction temperatures as a function of power)

To achieve repeatable shot volume:

- If repeatability is inadequate, consider the effect of the dispense tip, the effect of shear and time, the effect of cure (if it is a CIP material), and the effect of adding a precision valve (if necessary)

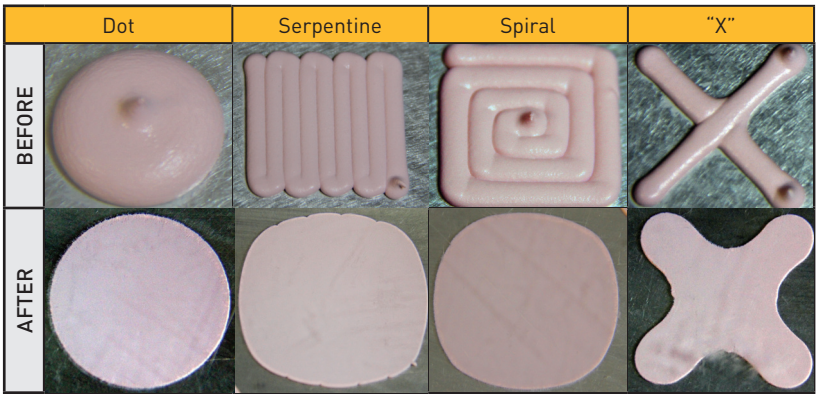


Figure 5: Dispensing Patterns A simple dot like the first pattern provides adequate coverage, shortest cycle time, and least chance of introducing air into the TIM. The more complex the profile, the greater the probability for introducing air (ex: Serpentine and Spiral).

- Always establish a minimum volume that is required to cover the entire range of gap volumes
- Build in a shot-size calibration process to verify that dispense rates are not variable - adjust dispense pressure or shot times as a function of shot-size measurements

To optimize the shape of the dispensed material:

- Determine a pattern (dot, line, or serpentine) that will "wet" the entire target, and that offers a bead height sufficient to fully contact the opposing target surface without air voids
- Consider the path of egress to minimize any possible air-entrapment
- Optimization of pattern can reduce material consumption while ensuring the functional gap is filled

To properly locate (or register) the dispensed material to the part:

- Start with proper fixturing and adjustment scheme to ensure registration between dispense head and part
- Build appropriate verification checks into the process

To optimize cycle time:

- Adjust dispense pressure (increase), needle orifice diameter (increase), and hose lengths/angles/flow obstructions of the delivery system (decrease)
- Beware of trade-offs associated with improvement of flow and cycle time, such as effects of shear on the material, sag/slump behavior, effects on shape of pattern, and filler separation in delivery system (damming)

Technical Parameters

Surface Wetting

The surface of the part should be free from lint, processing oils, or general FOD (foreign object debris). If there is a concern with cleanliness, the surface can cleaned with a mild solvent, such as isopropyl alcohol (IPA), or any suitable surface cleaner.

The objective is to have the dispense tip as low as possible to achieve sufficient wetting and bead initiation/termination (see figure 5). This may require some trials to determine the appropriate combination of dispense tip diameter, height, and corresponding speed and service pressure.

The first consideration is to target each bead shape and volume to properly wet and fill the gap between the two surfaces. As an initial recommendation, consider a bead height of 2X to 3X the nominal gap to promote wetting.

As a general rule, increased surface roughness will increase the surface area available for wetting. In vertical applications, the increased surface roughness will provide an increased resistance to slide (for any additional technical support regarding GEL30 in a vertical gap please contact Parker Chomerics Applications Group).

Generally, increasing the shot size, contact area, and surface roughness will aid in slide resistance of the material.

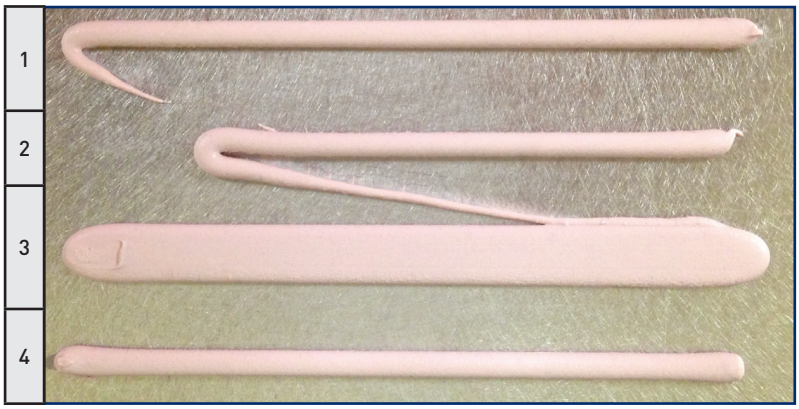


Figure 6: Common Line Dispensing Concerns Common dispensing issues; (top) system did not have a program for bead termination, (middle top) needle was too high and there was no bead termination programed, (middle bottom) needle too low, (bottom) correct height with bead termination

In some cases, a degree of staging time (prior to further processing) will enhance wetting of the TIM to the target surfaces (i.e. component, heat spreader)

In cases where rework is required, first remove the material completely using IPA or any mild surface cleaner, then reapply TIM. When using a CIP material, it may be more difficult to peel the material off the components once it is cured. The best way to remove the material is to abrade the surface with a soft tool (wooden stick or Q-tip) and then clean the surface with IPA (toluene may work better).

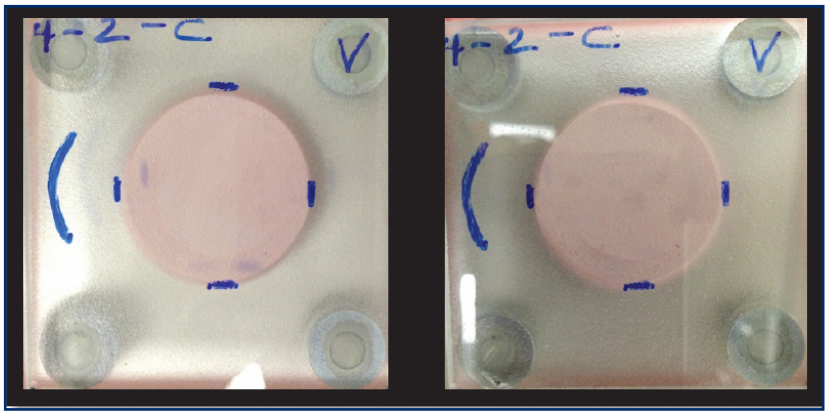


Figure 7: Reliability Reports The images above show one of the 18 trials that were performed on GEL30 in a vertical orientation tested under several different surface roughnesses, gaps, and surface areas. The test fixtures were subject to temperature shock and random vibration. Contact Parker Chomerics Applications for report. *(Image to the left is before and Image to the right is after the treatment)*

Technical Parameters

Special Material Considerations

Therm-A-Gap GELs are fully cured elastomers that are loosely cross-linked and can easily be extruded. Excessive shear force from complex dispense geometries and high pressure can affect the material structure and affect the rheology of the material. It is important to minimize the degree of shear imparted on the GELs by using a needle with a larger orifice, larger inner diameter tubing, fewer elbows, and lower pressure. Due to this sensitivity to shear, the GELs are designed to be dispensed out of the packaging only once. Repackaging would change the mechanical properties of the material. For reworking, it is recommended to use a cloth, lint free towel, or spatula to remove the GEL from the substrate. The material should be removed, and fresh material should be reapplied.

Therm-A-Form (Cure-In-Place) Compounds are designed to be dispensed and cured directly into the application. The surfaces that the mixed compounds are applied to should be free from any cure-inhibiting contaminants, especially those containing; nitrogen, sulfur, tin, phosphorus, and latex. It is important to consider the cure times and temperatures required to fully cure the material and their effect on processing, cycle times, and substrates. Generally, for the thermal cure materials, every 10°C increase in cure temperature will reduce the cycle to half of the original time (keeping in mind the exposure limits of other components). Another important consideration for these systems is pot-life. Once catalyzed, there is a finite amount of time that material will flow adequately. Proper measures must be addressed to ensure shot size control. Static mixing nozzles are provided with all standard two-component Therm-A-Form products. It is important to use the appropriate static mixing nozzle as they differ with mix ratio (i.e. 1:1 and 10:1). Components encapsulated by a Therm-A-Form compound can be removed by notching and peeling away the cured compound from the components.

Other thermally conductive dispensable materials such as thermal greases were the historical thermal solution. These materials were designed to achieve minimum bond-line. The typical application is through stenciling or screen printing. It is important in both of these methods to ensure that the screen or stencil is a minimum of 3X thicker than the maximum particle size in the compound. If the holes of the screen are too small or the stencil is too thin, it may filter out some of the conductive particles in the compounds. Due to the non-crosslinked nature of these materials, they may have a tendency to separate in the package. It is best practice to always mix the material prior to usage. For reworking, the material can be removed with a simple cleaning solvent prior to reapplying.

Ordering Information

Table 4: Standard Packages 6W-XX-YYYYY-ZZZZ

	W	XX	YYYYY	ZZZZ
GELS	5 = Standard Packaging	00	Therm-A-Gap Gel™ T630, T630G, T635, T636, GEL8010, GEL30 & GEL30G	0010 = 10cc Syringe with Plunger
				0030 = 30cc Taper Tip Cartridge
				0300 = 300cc Aluminum Cartridge (Caulking Style)
				3790 = 1 Gallon Pail (3790cc)
				ZZZZ = 5 Gallon Pail (Max 50lbs)
	9 = Custom Configuration	11	Custom Part Number	Therm-A-Gap Gel™ Material Code T630(G), T635, T636, T652, GEL8010, GEL30
THERM-A-FORM	5 = Standard Packaging	00	Therm-A-Form™ (10:1) T642	0035 = 35cc Kit
				0250 = 250cc Kit
			Therm-A-Form™ (1:1) T644, T646 and T647	0045 = 45cc Kit
				0200 = 200cc Kit
			Therm-A-Form™ Compound 1641 & Primer 1086	0000 = 2.5oz Tube
		01		0000 = 12oz Cartridge
		00	Therm-A-Form™ Compound 1642 & Primer 1087	0000 = 8oz. Jar
GREASE	5 = Standard Packaging	00	Thermal Grease T650, T660 & T670	0080 = 8oz. Jar (80cc)
				0160 = 8oz. Jar (160cc)
				3790 = 1 Gallon Pail

Table 5: Packaging Options

	A	Primer Vial	H	45cc Cartridge Kit (1:1) w/ Static Mixe	O	8 oz. Plastic Jar
	B	1.4cc Jar	I	55cc Optimum Cartridge	P	12 oz. SEMCO
	C	2.5cc Tube	J	200cc Cartridge Kit (1:1)	Q	20 oz. SEMCO
	D	10cc Syringe w/ Cap	K	250cc Cartridge Kit (10:1) w/ Static Mix	R	32oz SEMCO
	E	30cc Taper Tip Cartridge	L	300cc Aluminum Caulking Tube (13oz)	S	1 Gallon Pail
	F	30cc Optimum Cartridge/Tip	M	6oz. SEMCO	T	5 Gallon Pail
	G	35cc Cartridge Kit (10:1) w/ Static Mixer	N	8 oz. SEMCO		

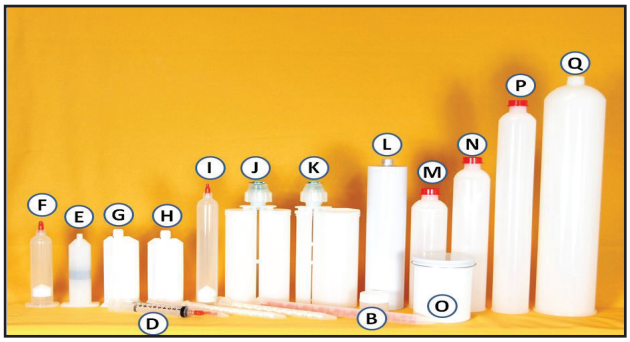


Figure 8: Typical Packaging Options

Figure 9: Typical High Volume Packaging Options *(In order of left ro right using Table 5 for definitions)* S and T

Parker Chomerics

Chomerics Worldwide

North America

Division Headquarters
Woburn, MA
phone +1 781-935-4850
fax +1 781-933-4318
chomailbox@parker.com

South America
Sao Paulo Brazil
phone +55-11-4195-0444
fax +55-11-4195-7580

Europe

High Wycombe, UK
phone +44 1494 455400
fax +44 1494 455466
chomerics_europe@parker.com

Saint Ouen l'Aumône, France
phone +33 1 34 32 39 00
fax +33 1 34 32 58 00

Asia Pacific

Hong Kong
phone +852 2428 8008
fax +852 2786 3446
chomerics_ap@parker.com

Shanghai
phone +8621 2899 5000
fax +8621 2899 5146

Shenzhen
phone +86 755 8974 8558
fax +86 755 8974 8560

Tokyo, Japan
phone +81 3 6408 2369
fax +81 3 5449 7202

Manufacturing Facilities:
Woburn, MA; Hudson, NH; Cranford, NJ; Millville, NJ; Fairport, NJ; Monterrey, Mexico; Grantham, UK; Shanghai, and Shenzhen China; Tokyo, Japan.

Additional Facilities:
Sadska, Czech Republic; Tianjin, China; Chennai, India.

www.chomerics.com
www.chomericstest.com
www.parker.com

Literature Number: AN 1006 EN April 2014

Parker Chomerics

ENGINEERING YOUR SUCCESS.