



TIMTRONICS

THEMAL INTERFACE MATERIALS

ADVANCED THERMALLY CONDUCTIVE MATERIALS

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What's New

Following the latest trends of the Power Electronics' designs, more and more relevance is given to compounds with high thermal conductivity (see High Performance compounds, Grey Ice series, page 7). The Grey Ice 4060 compound, with its 6 [W/(m·K)] thermal conductivity and non-silicone base, is for sure one of the most interesting high thermal-performance materials on the market.

A very high relevance is given also to the stability and reliability of the compounds, over time and usage. This led to the development of a new generation of materials: Blue Ice 410, 422 and 425 (see Non-Silicone Compounds, Blue Ice series, page 4), White Ice 510, 511 (see Silicone Compounds, White Ice series, page 5), Grey Ice 4200 (see High Performance compounds, Grey Ice series, page 7).

Highlights

In addition to the classics, Timtronics offer materials you will not be able to find competitors to, in the market. For instance, feel free to consider the high temperature compounds (see High-Temperature compounds, Red Ice series, page 8), or food grade compounds (see White Ice 510FG, a page 5).

The Red Ice 610 compound, combines both, the high-temperature characteristics together with the food grade requirements, with non-silicone base formula.

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SECTION 1: COMPOUNDS

Non-Silicone Compounds (Blue Ice series)

Timtronics Non-Silicone Compounds (Blue Ice Series) are formulated with synthetic fluids and highly conductive ceramic fillers. These finely engineered greases provide low bleed and solve the problems of contamination and migration associated with silicone-based products.

Compared to traditional Silicone compounds, Timtronics Non-Silicone Compounds offer a better stability for a longer life cycle, also with a very high thermal-conductivity.

Product		410	411	412	414	425	430
	Measurement (Specs), [Units]						
Binder	-	Non-Silicone					
Color	-	White					
Viscosity	Helipath Stand (5 rpm @25°C), [Pa·s]	-	90	400	-	-	220
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	2.7	2.4	2.4	1.7	2.4	2.7
Operating Temp. Range	[°C]	-55 .. +200					
Shelf Life	[Years]	5					
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	1.0	0.8	2.0	3.7	1.2	3.0
Thermal Resistance	(ASTM D5470), [(K·in ²)/W]	0.03	0.01	0,03	0,014	-	0.01
Breakdown Voltage @0.05"gap	(ASTM D149), (@0.05"gap), [KV/mm]	13.8	16.0	16,0	11.4	10.0	16.0
Dissipation Factor	(@ 1KHz)	0.0026	0.0120	0,003	0.0012	0.0026	0,017
Volume Resistivity	(ASTM D257), [Ω·cm]	1.8 · 10 ¹⁴	10 ¹⁴		2.8 · 10 ¹²	1.8 · 10 ¹⁵	10 ¹⁴

Silicone Compounds

(White Ice series)

White Ice Series are Silicone based thermally-conductive greases specifically formulated with binding agents and highly conductive ceramic-fillers that stop bleeding and separation, and deliver a very high thermal conductivity (up to 3.7 [W/(m·K)]). So, that a lower thermal resistance can be achieved than using films, pads, or thermoplastics.

The excellent wetting and spread-ability properties of the Timtronics silicone compounds make them the best

choice for thin bond film applications.

The innovative White Ice 510FG compound is the Food Grade version of the classic White Ice 510.

Product		510FG	510	510CR	511	515	530
	Measurement (Specs), [Units]						
Binder	-	Silicone					
Color	-	White					
Viscosity	Helipath Stand (5 rpm @25°C) , [Pa·s]	160	150	720	50	40	180
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	2.2	2.2	2.3	2.5	2	2.7
Operating Temp. Range	[°C]	-55 .. +200	-55 .. +205				
Shelf Life	[Years]	5					
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	0.8	0.8	1.0	2.0	2.0	3.0
Thermal Resistance	(ASTM D5470), [(K·in ²)/W]	0.05			0.025	0.017	0.01
Breakdown Voltage @0.05"gap	(ASTM D149), (@0.05"gap), [KV/mm]	15.0			16.0		
Dissipation Factor	(@ 1KHz)	0.0021			0.0028	0.0026	0.0028
Volume Resistivity	(ASTM D257), [Ω·cm]	10 ¹⁴					

Dielectric (Silicone) Compounds

Dielectric (Silicone) Compounds are extremely stable greases that are useful over a wide temperature range and in a variety of adverse operating conditions. They are highly resistant to oxidation and totally impervious to water.

Because of their operating and compatibility properties, Dielectric (Silicone) Compounds can be highly

effective in a variety of applications, such as automotive and aircraft ignitions, valve seats, "O" rings, lip seals, transformer connections, speed and brake cables, etc. They are suitable for being used with metal, rubber, plastic and vinyl materials and are a desirable moisture barrier.

910 is non-melting, odorless and tasteless. It is resistant to hot and cold water, steam and most disinfectant solutions. 910 has been laboratory tested to comply with appropriate electrical ratings as listed below.

Product		910
	Measurement (Specs),[Units]	
Binder	-	Silicone
Color	-	Translucent
Viscosity	Helipath Stand (5 rpm @25°C) , [Pa·s]	70
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	1.1
Operating Temp. Range	[°C]	-55 .. +200
Shelf Life	[Years]	5
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	0.09
Thermal Resistance	(ASTM D5470), [(K·in ²)/W]	N/A
Breakdown Voltage @0.05"gap	(ASTM D149), (@0.05"gap), [KV/mm]	20
Dissipation Factor	(@ 1KHz)	N/A
Volume Resistivity	(ASTM D257), [Ω·cm]	10 ¹³

SECTION 2: SPECIAL COMPOUNDS

High Performance Compounds (Grey Ice series)

Timtronics high performance thermal greases (Grey Ice series) are new, designed to meet the thermal, reliability and low price requirements of high-end chipset, graphic processors trend and ever-faster clock speeds.

Grey Ice LV type is thermal compound especially designed with low viscosity and excellent wetting property to use with screen printing and automated dispensing equipment.

Grey Ice 4200 is thermal grease with an outstanding thermal performance, and stability over time and severe working conditions.

Please do not hesitate to contact us for further documentation, references and information (e.g. application devices and methods, and so on).

Product		4100LV	4200	4050LV	4060	5100	
	Measurement (Specs),[Units]						
Binder	-	Non-Silicone				Silicone	
Color	-	Grey					
Viscosity	Helipath Stand (5 rpm @25°C), [Pa·s]	100	450	480	700	550	
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	2.2	2.4	2.4	2.4	2.2	
Operating Temp. Range	[°C]	-55 .. +200				-55 .. +205	
Shelf Life	[Years]	5					
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	2.6	3.2	5.0	6.0	2.6	
Thermal Resistance	(ASTM D5470), [(K·in ²)/W]	0.014	0.010	0.005	0.005	0.010	
Breakdown Voltage @0.05"gap	(ASTM D149), (@0.05"gap), [KV/mm]	2.8	2.8	2.8	2.8	2.8	
Dissipation Factor	(@ 1KHz)	0.12	0.12	0.12	0.12	0.1277	
Volume Resistivity	(ASTM D257), [Ω·cm]	10 ⁹					

High Temperature Compounds

(Red Ice series)

Red Ice Series High Temperature Thermal Compounds (HTC) are specifically formulated for applications with continuous operating temperatures over 200°C. This series of thermal compounds has shown outstanding heat transfer and stability to high temperature electronics and industrial applications. They are available in Non-Silicone and Silicone formula.

Product		610FG	610	611	611HTC	613	614
	Measurement (Specs),[Units]						
Binder	-	Non-Silicone			Silicone		
Color	-	White		Grey	White	Grey	
Viscosity	Helipath Stand (5 rpm @25°C) , [Pa·s]	600	200	150	60	100	
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	2.9	3	3.2	2.3	2.1	
Operating Temp. Range	[°C]	-55 .. +300		-55 .. +360		-55 .. +250	
Shelf Life	[Years]	5					
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	1.0	0.8	3.2	1.2	2.2	
Thermal Resistance	(ASTM D5470), [(K·in ²)/W]	0.05	0.06	0.0016	0.04	0.03	
Breakdown Voltage @0.05"gap	(ASTM D149), (@0.05"gap), [KV/mm]	14.0	15.0	3.0	16.0	2.8	
Dissipation Factor	(@ 1KHz)	0.0020	0.0016	0.12	0.0025	0.12	
Volume Resistivity	(ASTM D257), [Ω·cm]	10 ¹⁴	10 ¹⁴	10 ¹⁰	10 ¹⁴	10 ⁹	

Electrically Conductive Compounds **(Black Ice and Silver Ice series)**

Black Ice 711 and 712, and Silver Ice 710 are formulated with highly conductive fillers for Electrically (and Thermally) Conductive applications. Ideal for low power electronics application includes static drains, grounding, "soft" electronics connections, heat dissipation, and assembly protections.

The Silver Ice 710 compounds offers outstanding thermal and electrical performances.

Product		710	710NS	720	711	712	713	
	Measurement (Specs),[Units]							
Binder	-	Non-Silicone			Non- Silicone	Silicone	Non- Silicone	
Color	-	Silver			Black			
Viscosity	Helipath Stand (5 rpm @25°C) , [Pa·s]	500	200	250	250	250	>5000	
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	4.8	4	4.2	1.3	1.3	3.2	
Operating Temp. Range	[°C]	-55 .. +200					-55 .. +360	
Shelf Life	[Years]	5						
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	7.0	7.0	7.2	2.2	2.2	1.8	
Thermal Resistance	(ASTM D5470), [(K·in ²)/W]	0.01	0.01	0,008	0.05	0.05	N/A	
Breakdown Voltage @0.05"gap	(ASTM D149), (@0.05"gap), [KV/mm]	N/A						
Dissipation Factor	(@ 1KHz)	N/A						
Volume Resistivity	(ASTM D257), [Ω·cm]	< 0.010	< 0.010	< 0.010	< 0.25	< 0.25	< 0.25	

Electrical Joint Compounds

(EJC series)

Electrical Joint Compounds (EJC) are specially formulated with latest technology to prevent oxide film formation on metal surfaces and prevents corrosion. They offer superior weathering characteristics over wide temperature ranges, and provide highly conductive tight joints. Proprietary filler particles help in penetrating oxide films and act as electrical bridges between conductor strands, help in gripping conductor, improve electrical conductivity and enhance integrity of the connection.

Key Features:

- *Prevent oxide films*
- *Improved service life for both Cu and Al connections.*
- *Provide “gas-tight “with high conductivity.*
- *Excellent lubricant, reduce galling & seizing*

Application instructions:

- *Scratch the conductor surfaces with brush until bright and clean.*
- *Immediately apply EJC compound to the conductive surfaces.*
- *Remove all excess compounds after installation is complete.*

Product		EJC-741	EJC-742	EJC-744	EJC-745SL	EJC-745NS
Measurement (Specs),[Units]						
Binder	-	Non-Silicone	Non-Silicone	Non-Silicone / Abrasive	Silicone	Non-Silicone
Color	-	Black	Coper	Amber	White/Grey	White/Grey
Viscosity	Helipath Stand (5 rpm @25°C) , [Pa·s]	500	200	250	250	250
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	4.8	4	4.2	1.3	1.3
Operating Temp. Range	[°C]	-40 .. 150	-40 .. 150	-40 .. 150	-40 .. 200	-40 .. 200
Shelf Life	[Years]	5				
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	1.0	0.9	0.5	1.0	0.8
Thermal Resistance	(ASTM D5470), [(K·in ²)/W]	0.01	0.01	0,008	0.05	0.05

SECTION 3: ADHESIVES

Thermally conductive adhesives

In this section only some of the most popular Timtronics' adhesive materials are described.

Thermally conductive adhesives (TIM 800 series) are designed for demanding needs for die-attach, heat sink

bonding and surface mount applications. They rapidly transfer heat, eliminate hot spot, and increase the operating efficiency of most devices. Its low shrinkage minimizes risk of damage to fragile components.

Typical applications include mechanical connection between heat sinks, semiconductor bonding, transistors to heat-sink bonding for wireless communications, satellite transmission and circuit board manufacturing.

Product		806	816 T2	816 HTC	817	817 B-2	825 NH	886 NH
Properties	Measurement (Specs), [Units]							
	-	FAST CURE	FLEXIBLE HIGH STRENGHT	FLEXIBLE	TOUGHENED HIGH PERFORMANCE	FLEXIBLE	NON HAZMAT	NON HAZMAT
Key Properties	-	-General Purpose -Rigid bonds -Bonds to wide variety	-Long work life	-High thermal conductivity -Long work life	-High bond strength -Bonds to metal & plastics	-High thermal conductivity -Long work life	-High Temperature resistance -High shear, rigid -Bonds to metal	-Low work life -High bond strenght -Bonds to metal & plastics
Mix Ratio by volume (R/H)	-	1:1	1:1	1:1	2:1	1:1	100:6	1:1
Specific gravity	-							
Pot Life	(100 grams) @25°C	5 -10min	2 hrs	2 hr	60-90 min	2 hrs	30-45 min	60-90 min
Fixture time @RT	-	20-30 min	8 hrs	8 hrs	3-4 hrs	8 hrs	4-6 hrs	4-6 hrs
Cure	@25°C	8 hrs	24 – 48hrs	24-48 hrs	24 hrs	24-48 hrs	24 hrs	24-48 hrs
	@100°C	< 10 min @ 65°C	2 hrs	2 hrs	1hr @70°C	2 hrs	2 hrs @70°C	2 hrs
Color	-	Black	Black	Gray	Gray	Beige	Black	Black
Hardness	Shore D	81	72	72	80	72	86	86
Thermal Conductivity	[W/(m·K)]	1.7	1.6	2,7	1.4	>2	1.4	1.6
Lap Shear Strength to Aluminum	[10 ³ psi]	2.00	3,2	3,2	>3	3.20	2.50	>3
Operating Temp. Range	[°C]	-55 .. +90	-55 .. +110	-55 .. +110	-55 .. +125	-55 .. +110	-55 .. +155	-55 .. +125

Product		813	813LV	813HTC	811HP	818
Properties	Measurement (Specs), [Units]	TYPICAL PROPERTIES				
Key Properties	-	-High thermal conductivity -Non-sag paste -3 months shelf life	-High thermal conductivity -Paste -3 months shelf life @ 20°C	-High thermal conductivity -Non-sag paste -3 month shelf life @ 20°C	-excellent heat distribution -replaces mechanical fasteners, tapes and other clamping methods	
Components	#	1				
Specific gravity	-	-				
Pot Life	(100 grams)	10 – 15 min @125°C				-
Fixture time @RT		5 – 10 min @150°C				Activator
Cure Schedule	-	1 hr @125°C				
		10 min @ 160°C				
Color	-	Black	Black	Gray	Gray	White
Hardness	Shore D	93				-
Th. Conductivity	[W/(m·K)]	1.8	1.6	2.7	2.7	0.663
Lap Shear Strength to Aluminum	[10 ³ psi]	3.10	>3	>3	>4	-
Operating Temp. Range	[°C]	-55 .. +200				-5 .. +150

Product		850FLT	PC 8550	PC 8550TC	PU 8530
-	Measurement (Specs), [Units]	TYPICAL PROPERTIES			
Components	#	1	2	2	2
Mix Ratio by wt. (R/H)	-	-	1:1	1:1	100/16
Specific gravity	-	1.56	1.60	1.69	-
Pot Life	(500 grams)	20 min @ 80°C	1-2 hr @25°C	1-2 hr @25°C	40- 70 min @25 °C (250 grams)
Shelf Life	-	3 months @25°C	1 year @25°C	1 year @25°C	-
Cure	-	1 hr @100°C + 1 hr @150°C	7-10 min @150°C	7-10 min @150°C	30 min @ 65 °C
		20 min @175°C	24-48 hr @25°C	24-48 hr @25°C	8-24 hrs @ 25 °C
Color	-	Black	Gray	Gray	Black
Specific Gravity	-	1.56	1.60	1.69	01.56.00
Hardness	Shore	62 Shore D	40 Shore A	42 Shore A	30-40 Shore D
Th. Conductivity	[W/(m·K)]	0.8	1.0	1.2	0.8
Service Temp. Range	[°C]	-55 .. +230	-55 .. +200	-55 .. +200	-30 .. +130

Electrically (& Thermally) Conductive Adhesives

Electrically (& thermally) conductive adhesives are typically used for die-attach, chip bonding, cold-soldering, and other microelectronic applications.

All products feature very high purity, low ionic content, wide operating temperature range and excellent electrical conductivity even after exposure for 1000 hours at 150°C.

Product		830M1	897M2
	Measurement (Specs), [Units]		
Feature	-	Flexible, RT cure or slightly at elevated heat cure	Easy to dispense, minimal tailing - Die attach applications
Number of components	-	2	1
Shelf Life	-	1 year @25°C	1 month, @ < 20°C
Shelf Life	-	#VALUE!	4 months, @0°C
Viscosity	(CP-51 spindle), [cps]	Smooth Paste	47,000 @5 rpm
Cure Schedule	-	2hr @100°C 24-48hr @25°C	1-2min @175°C 1 hr @100°C
Specific Gravity	-	3.2	3.2
Lap Shear Strength	(AL-AL), [psi]	1700	1300
T _{glass}	[°C]	45	82
CTE (below T _{glass})	[10 ⁻⁶ /°C]	72	56 @[-54..27]°C 75 @[27..80]°C
Thermal conductivity	[W / (m·K)]	2.7	1.8
Volume Resistivity	[Ω·cm]	2 · 10 ⁻³	4 · 10 ⁻⁴
Storage Temp.	[°C]	-	<< 25

SECTION 4: THERMAL FILLERS

Liquid Gap Fillers (LGF series)

Liquid Gap Fillers (LGF) are thermally-conductive silicone based liquid gap-filling materials formulated to provide a balance of cured material properties, high lighted by “gel-like” modulus and good compression set. These thermally conductive materials are available either in electrically insulating or conductive version, one part or two part, room or elevated curing temperature. They are ideal for applying any thickness with little or no stress.

Key Features:

- Stress absorbing flexibility (low modulus).
- Vibration dampening.
- Eliminate pad thickness/die-cut shapes.
- Excellent mechanical and chemical stability.
- Electrically insulating and/or conductive.
- Clean release from device/Re-workable.
- No Bleed, no cure by-product, 100% solids.
- Relieves CTE stresses during thermal cycling.

Applications:

- Filling various gaps between heat generating devices to heat sinks and housings.
- Automotive electronics, telecommunications, computers and peripherals.
- LED bonding/heat transfer.

Product		2004	2005	2006	2007	2030	2301	
	Measurement (Specs), [Units]	TYPICAL PROPERTIES						
Type	-	(1:1) Two parts , Silicone base					One part, Silicone base	
Color	Visual	Pink	Grey	Blue	Blue	Green	White	
Mixed Viscosity	(Brookfield)	150	73	120	80	400	N/A	
Specific Gravity	(ASTM D792),(@25°C), [g/cm3]	2.8	2	2.1	2.5	2.5	1,29	
Hardness	(ASTM D2240), (@25°C), [SHORE 00]	70.0	<5	Thixotropic Paste	45.0	35	35	
Pot life	(@25°C)	60 min.	90 min.	24 hrs.	90 min.	60 min.	15 min.	
Cure time	(@25°C)	24 .. 48 hrs.	24 .. 48 hrs.	48 hrs.	24 .. 48 hrs.	24 .. 48 hrs.	24 hrs.	
Cure time	(@100°C)	20 min.	30 min.	5 min.	30 min.	30 min.	N/A	
Operating temp. Range	[°C]	-55 .. 204					-55 .. 260	
Shelf life	(@25°C), [shore 00/(A)]	12 months						
Thermal Conductivity	(ASTM D5470), (@25°C),[SHORE 00]	2	1.2	0.8	1.5	3.5	0.2	
Breakdown voltage	(ASTM D149), (@25°C),[SHORE 00]	12				13	12	
Volume Resistivity	(ASTM D257), (@25°C),[SHORE 00]	10 ¹²						

Thermally Conductive Putties

Thermally conductive putties (TIM-Putties) are extremely soft and highly conformable paste-type gap fillers. With such a soft consistency, these materials assure an efficient heat transfer between delicate parts where minimum pressure can be tolerated. Thermally conductive putties are ideal for applying any thickness with little or no stress. They are designed to provide a thermal solution for the recent trends of integrating higher frequency electronics into smaller devices. Thermally conductive putties easily form and adhere to most surfaces, shapes and sizes of components with very low compression force.

Key Features:

- No need for curing processes.
- Stress absorbing flexibility
- Vibration dampening.
- Electrically insulating.
- “Form-in-place” gap filling with form stability.
- Relieve CTE stresses during thermal cycling.

Applications:

- Filling various gaps between heat generating devices to heat sinks and housings.
- Useful where systems need to be taken a part and reassembled during production or maintenance.
- To interface components with delicate leads.
- To fill gaps where surfaces are irregular or large.

Product		616	418	418HTC	3W	5W	6W
Measurement (Specs),[Units]							
Binder	-	Non-Silicone					
Color	-	Grey	White	Grey	White	Grey	Grey
Viscosity	Helipath Stand (5 rpm @25°C), [Pa·s]	2400	4500	4900	7000	7000	7000
Specific Gravity	(ASTM D792), (@25°C), [g/cm ³]	3.0	2.7	2.1	2.5	2.3	2.3
Operating Temp. Range	[°C]	-40 .. +360	-40 .. +150				
Shelf Life	[Years]	5					
Thermal Conductivity	(ASTM D5470), [W/(m·K)]	2.0	2.0	2.5	3.5	5.0	6.0
Breakdown Voltage	(ASTM D149), [KV/mm]	3.0	16.0	3.0	14.0	3.0	3.2
Volume Resistivity	(ASTM D257), [Ω·cm]	10 ⁹	10 ¹²	10 ⁹	10 ¹²	10 ⁹	10 ⁹



MATERIALS PRODUCED BY



TIMTRONICS
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35 Old Road • Yaphank, NY 11980 • Tel: 631-3456509 • www.timtronics.com • info@timtronics.com

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REI SRL
Via E. Majorana 8/B
I-35010 CADONEGHE PD Italy
T +39 049 701725 - F +39 049 8872986
www.reipower.it - info@reipower.it

