



Fujipoly New Product Technical Information

NEW PRODUCTS : SARCON[®] GR-ae

Thermal Conductive and Non-Flammable Silicone Gel Sheets

1. Features:

Sarcon[®] GR-ae is a general type of thermal conductive gel material, 1.3 Watt/m-K (No electricity conductive) in a versatile sheet form that easily fits and adheres to most all shapes and sizes of components, and makes reliable and complete physical contact. The surface consistency of the pads is excellent for filling air gaps and uneven surfaces.

- 1) Low thermal resistance
- 2) Soft , low stress on component and easy assembling

2. Variety of Sarcon[®] GR-ae Products:

Description	Construction	Application Guidelines
Sarcon[®] ##G-ae (GR-ae)	Silicone (gel) compound (Material :Sarcon [®] GR-ae)	Between chassis wall and other surface. Between CPU and heat sink. Between semiconductor and heat sink.
Sarcon[®] ##G-Hae (GR-Hae)	Silicone (gel) compound (Material :Sarcon [®] GR-ae) with hardened top surface	
Sarcon[®] ##G-Fae (GR-Fae)	Silicone (gel) compound (Material :Sarcon [®] GR-ae) with nylon mesh embedded overall	
Sarcon[®] ###G-HFae (GR-HFae)	Silicone (gel) compound (Material :Sarcon [®] GR-ae) with hardened top surface and nylon mesh embedded overall	

* Can be processed to custom designs. (cutting or punching)

* ## refers to a thickness of sheet. (Unit: 1/100mm)

3. Typical Product Properties:

3-1. Thermal Properties: (Typical Value)

Item		##G-ae (GR-ae)			##G-Hae (GR-Hae)			Test Method
Thermal Resistance (°C·cm ² /watt)	Force(kPa)	100	300	500	100	300	500	Fujipoly Test Method: TIM1300 Tester based on ASTM D5470.
	0.5mmT	4.08	3.21	2.78	4.31	3.47	2.96	
	1.0mmT	6.09	4.44	3.76	6.59	5.39	4.66	
	2.0mmT	9.74	6.88	5.52	11.68	9.14	7.24	
	3.0mmT	12.47	8.20	6.67	14.28	10.34	8.11	
Operating Temperature		-40 ~ +150 °C						Recommended range
Item		##G-Fae (GR-Fae)			##G-HFae (GR-HFae)			Test Method
Thermal Resistance (°C·cm ² /watt)	Force(kPa)	100	300	500	100	300	500	Fujipoly Test Method: TIM1300 Tester based on ASTM D5470.
	0.5mmT	4.27	4.13	3.85	4.48	4.35	4.13	
	1.0mmT	7.67	6.81	6.18	7.97	7.10	6.40	
	2.0mmT	12.88	10.58	9.08	13.07	11.10	9.70	
Operating Temperature		-40 ~ +150 °C						Recommended range



4. Typical Material Properties: (Typical Value)

Item	Unit	Sarcon® GR-ae	Test method	Specimen*1)
Color	-	Apricot	Visual	-
Specific Gravity	-	2.0	JIS K 6220 / ASTM D 792	A
Hardness	ASKER-C Shore-00	5 24	JIS K 7312 ASTM D2240	B
Thermal Conductivity	Watt/m·K	1.3	Hot Disk method tester (TPA-501) based on ASTM D2326	D
Tensile Strength	MPa	0.1	JIS K 6251(#2 Die)/ASTM D412	A
Elongation	%	300	JIS K 6251(#2 Die)/ASTM D412	A
Tear Strength	N/mm	0.7	JIS K 6252(Angle Die)/ASTM D624	A
Volume Resistivity	MΩ·m	1×10 ⁶	JIS K 6249/ASTM D257	C
Breakdown Voltage	kV/mm	17	JIS K 6249/ASTM D149	C
Flame Retardancy	-	V-0	UL94 standard	E
Low Molecular Weight Siloxane Content (D ₄₋₂₀)	wt%	Less than 0.0010	Gas Chromatography method: Extraction solvent: Carbon Tetrachloride	-

Remark 1) Specimen A 2.0mm thickness (200G-ae)

Specimen B 30mm width x 50mm length x 3mm thickness (300G-ae), 4 sheets stacked

Specimen C 120mm width x 120mm length x 1mm thickness (100G-ae)

Specimen D 50mm width x 50mm length x 3mm thickness (300G-ae), 3 sheets stacked

Specimen E 13mm width x 125mm length

5. Configuration:

Type	Product Description	Width x Length	Thickness
Sarcon® GR-ae Sarcon® GR-Hae Sarcon® GR-Fae Sarcon® GR-HFae	50G-ae / 50G-Hae 50G-Fae / 50G-HFae	Max. 300x200	0.50±0.15mm
	100G-ae / 100G-Hae 100G-Fae / 100G-HFae		1.00±0.20mm
	200G-ae / 200G-Hae 200G-Fae / 200G-HFae		2.00±0.30mm
	300G-ae / 300G-Hae		3.00±0.30mm
	400G-ae / 400G-Hae		4.00±0.40mm
	500G-ae / 500G-Hae		5.00±0.50mm

Remark / When product thickness is more than 5.0mm, a product is stacked.

Thickness tolerance of stacked product is the sum of these tolerances of each



6. Compression vs. Compression Load: (Typical Value)

Compression Rate		50G-ae	100G-ae	200G-ae	300G-ae	400G-ae	500G-ae
Load (N)	10%	118	131	72	36	17	12
	20%	299	203	114	69	33	28
	30%	443	275	178	94	53	47
	40%	570	378	287	149	85	78
	50%	705	523	410	221	138	120
	Sustain 50%	383	271	224	115	60	53
Compression Rate		50G-Hae	100G-Hae	200G-Hae	300G-Hae	400G-Hae	500G-Hae
Load (N)	10%	158	174	65	39	24	21
	20%	385	274	119	72	51	41
	30%	563	395	175	123	88	72
	40%	721	563	278	207	151	123
	50%	905	783	431	334	243	200
	Sustain 50%	606	492	250	197	130	106
Compression Rate		50G-Fae	100G-Fae	200G-Fae			
Load (N)	10%	127	91	68			
	20%	348	293	155			
	30%	587	481	263			
	40%	818	695	398			
	50%	1057	933	555			
	Sustain 50%	771	482	248			
Compression Rate		50G-HFae	100G-HFae	200G-HFae			
Load (N)	10%	133	171	80			
	20%	371	401	191			
	30%	645	627	337			
	40%	914	880	515			
	50%	1193	1161	726			
	Sustain 50%	978	682	359			

*Test method: Specimen 25mm x 25mm

Measured the force at 50% compression with the 25x25mm specimen set between two Aluminum plates (27mmW x 27mmL x 4.0mmT)

*Test Condition Compression Velocity: 5.0mm/minute with 1960N(200kgf) load Cell

Measurement: Compression Load tester (Aikoh Engineering MODEL-310N)

Sustain 50%: Sustain 50% at 1 minute later



7. Aging Test: (Typical Value)

7-1. Test Condition: +70°C x 2000 hrs. --- Sarcon® GR-ae

Property	Unit	Initial	100hrs.	250hrs.	500hrs.	1000hrs.	2000hrs.
Specific Gravity	-	2.0	2.0	2.0	2.0	2.0	2.0
Hardness	ASKER-C	5	5	5	5	5	5
Thermal Conductivity	W/m·K	1.3	1.3	1.3	1.3	1.3	1.3
Thermal Resistance	°C·cm ² /W	7.2	7.2	7.2	7.3	7.3	7.3
Tensile Strength	MPa	0.1	0.1	0.1	0.1	0.1	0.1
Elongation	%	300	280	270	250	250	250
Tear Strength	kN/m	0.7	0.7	0.7	0.7	0.8	0.8
Volume Resistivity	MΩ·m	1x10 ⁶	9x10 ⁵	8x10 ⁵	8x10 ⁵	9x10 ⁵	9x10 ⁵
Breakdown Voltage	kV/mm	17	17	17	18	19	20

7-2. Test Condition: +150°C x 2000 hrs. --- Sarcon® GR-ae

Property	Unit	Initial	100hrs.	250hrs.	500hrs.	1000hrs.	2000hrs.
Specific Gravity	-	2.0	2.0	2.0	2.0	2.0	2.0
Hardness	ASKER-C	5	6	6	6	6	6
Thermal Conductivity	W/m·K	1.3	1.3	1.3	1.3	1.3	1.3
Thermal Resistance	°C·cm ² /W	7.2	7.2	7.3	7.3	7.3	7.4
Tensile Strength	MPa	0.1	0.1	0.1	0.1	0.1	0.1
Elongation	%	300	240	220	200	150	150
Tear Strength	kN/m	0.7	0.7	0.7	0.8	0.8	0.8
Volume Resistivity	MΩ·m	1x10 ⁶	1x10 ⁶	3x10 ⁶	4x10 ⁶	5x10 ⁶	9x10 ⁶
Breakdown Voltage	kV/mm	17	19	19	19	23	24

7-3. Test Condition: +60°C/95%RH x 2000 hrs. --- Sarcon® GR-ae

Property	Unit	Initial	100hrs.	250hrs.	500hrs.	1000hrs.	2000hrs.
Specific Gravity	-	2.0	2.0	2.0	2.0	2.0	2.0
Hardness	ASKER-C	5	5	5	5	5	5
Thermal Conductivity	W/m·K	1.3	1.3	1.3	1.3	1.3	1.3
Thermal Resistance	°C·cm ² /W	7.2	7.2	7.2	7.2	7.2	7.2
Tensile Strength	MPa	0.1	0.1	0.1	0.1	0.1	0.1
Elongation	%	300	300	290	290	270	270
Tear Strength	kN/m	0.7	0.7	0.7	0.8	0.8	0.8
Volume Resistivity	MΩ·m	1x10 ⁶	2x10 ⁵	2x10 ⁵	2x10 ⁵	4x10 ⁵	2x10 ⁵
Breakdown Voltage	kV/mm	17	19	19	19	18	20

7-4. Test Condition: -40°C/30min ⇄ +125°C/30min x 2000 hrs. --- Sarcon® GR-ae

Property	Unit	Initial	100hrs.	250hrs.	500hrs.	1000hrs.	2000hrs.
Specific Gravity	-	2.0	2.0	2.0	2.0	2.0	2.0
Hardness	ASKER-C	5	10	15	20	25	24
Thermal Conductivity	W/m·K	1.3	1.3	1.3	1.3	1.3	1.3
Thermal Resistance	°C·cm ² /W	7.2	7.2	7.3	7.3	7.4	7.4
Tensile Strength	MPa	0.1	0.1	0.1	0.1	0.1	0.2
Elongation	%	300	220	180	160	150	150
Tear Strength	kN/m	0.7	0.7	0.7	0.8	0.8	0.9
Volume Resistivity	MΩ·m	1x10 ⁶	1x10 ⁶	2x10 ⁶	3x10 ⁶	2x10 ⁶	2x10 ⁶
Breakdown Voltage	kV/mm	17	19	20	20	22	24

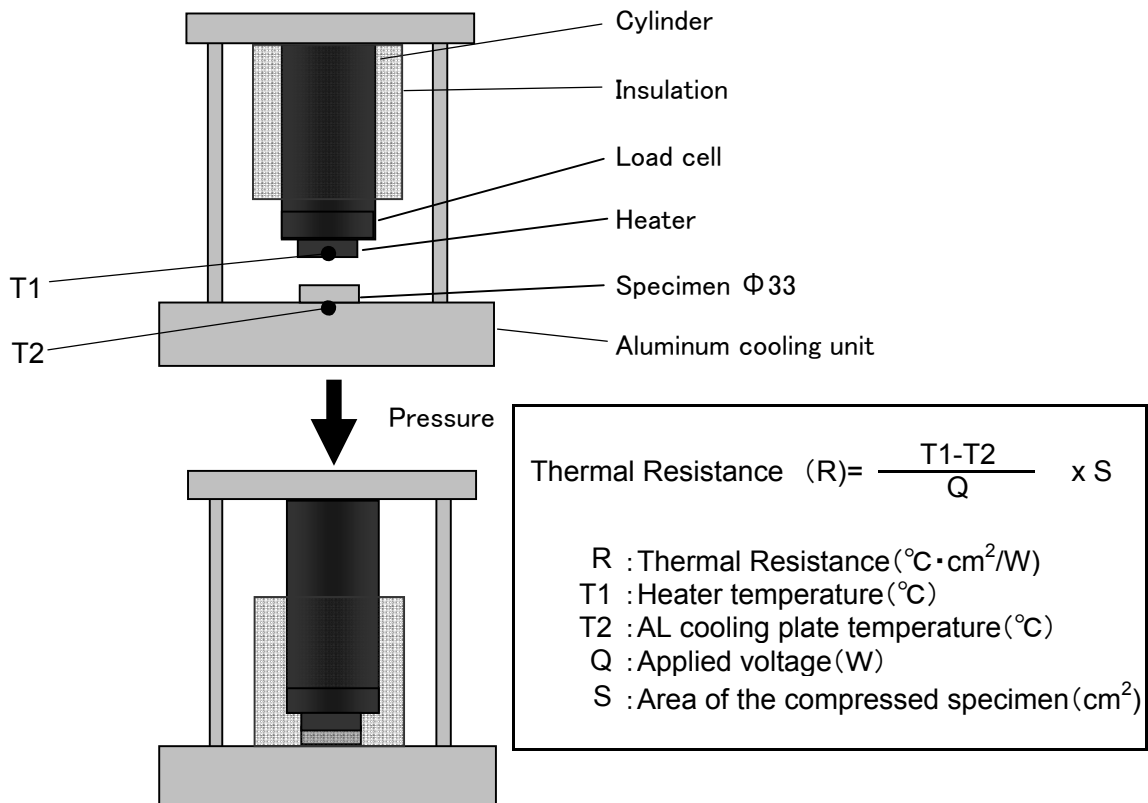
Remark / The test methods are the same as content 3 and 4.



Conversion of Unit

Thermal Resistance $1\text{ }^{\circ}\text{C}\cdot\text{cm}^2/\text{W} = 0.155\text{ }^{\circ}\text{C}\cdot\text{inch}^2/\text{W}$
 Tensile Strength: $1\text{ kgf/cm}^2 = 0.0981\text{ MPa}$
 Tear Strength: $1\text{ kgf/cm} = 0.981\text{ N/mm}$
 Thermal Conductivity: $1\text{ cal/cm}\cdot\text{sec}\cdot^{\circ}\text{C} = 419\text{ W/m}\cdot\text{K}$
 Load: $1\text{ kgf} = 9.8067\text{ N}$

Test method of TIM tester



Test method of Thermal Conductivity

Thermal conductivity value is calculated the measured thermal resistance using above testing method and the specimen's thickness

Notes:

- Properties of the products may be revised due to some changes for improving performance.
- Properties values in this document are not specification or guaranteed.
- All Fujipoly test data in this document are based on Fujipoly test method and are believe to be accurate and reliable. Nevertheless, any Fujipoly test data shows typical product properties, and does not show the guaranteed product properties.
- Some silicone oil may exude from the product according to operating conditions.
- Some low molecular siloxane may vaporize from the product according to operating conditions.
- It is advisable to use the product under recommended operating condition. Some more silicone oil may exude from the product if it was used over the recommended condition.
- It is advisable to use the product under parallel and even compression. Some more silicone oil may exude from the product if it was used under excessive or partial stress.
- Products testing by the purchaser is recommended in order to meet expected results such as performance and application.
- The products in the document are low hardness ones. The products may deform to some extend when taking the sheets off the liner. Customer are advised to test the handling performance before use.

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