

# **FUJIPOLY<sup>®</sup>**

## **SARCON<sup>®</sup> GR-I Series.**

**High Thermally Conductive and Non-Flammable Silicone Gel Sheets.**

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ISO9001

	Page
<b>1] Product Name.</b> .....	<b>-02-</b>
<b>2] Features.</b> .....	<b>-02-</b>
<b>3] Variety of Sarcon® GR-I products.</b> .....	<b>-02-</b>
<b>4] Type and Configuration.</b> .....	<b>-03-</b>
<b>5] Typical properties.</b> .....	<b>-04-</b>
<b>6] Thermal properties.</b> .....	<b>-04-</b>
<b>1) Thermal Resistance.</b> .....	<b>-04-</b>
<b>2) Thermal Conductivity.</b> .....	<b>-04-</b>
<b>7] Heat Aging Test.</b> .....	<b>-05-</b>
<b>1) Test Condition : 70°C (158°F) x 1,000hrs (42days)</b> .....	<b>-05-</b>
<b>2) Test Condition : 150°C (302°F) x 1,000hrs (42days)</b> .....	<b>-06-</b>
<b>8] Humidity Test. 60°C (140°F) x 1,000hrs (42days) x 90%RH</b> .....	<b>-07-</b>
<b>9] Mechanical Property / Compression VS Compression Load</b> .....	<b>-08-</b>
<b>10] Extractable Volatiles.</b> .....	<b>-09-</b>
<b>11] Flame Retardancy.</b> .....	<b>-09-</b>
<b>12] Test Method for Sarcon® GR-I products.</b> .....	<b>-10-</b>
<b>1) Thermal Resistance.</b> .....	<b>-10-</b>
<b>2) Gas Chromatography Analysis.</b> .....	<b>-11-</b>
<b>13] Other Technical Information and Design Guide</b> .....	<b>-12-</b>

# FUJIPOLY<sup>®</sup> DATA SHEET

FPDS 05-38 (Version 2)

## 1] Product Name :

Sarcon<sup>®</sup> GR-I material (Gap Filler pads.)

## 2] Features. :

Sarcon<sup>®</sup> GR-I is a highly conformable, thermally conductive gel material, 2.8Watt/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 due to the high thermal conductivity.
- 2) UL94 V-0 class.
- 3) Low content of Low Molecular Siloxane.

## 3] Variety of Sarcon<sup>®</sup> GR-I products.

Table - 1

Series	Construction	Application Guidelines
<b>Sarcon<sup>®</sup> GR-I</b>	Silicone compound	Between a chassis wall and other surface. Between semiconductor and heat sink. Large area heat transfer to heat sink.
<b>Sarcon<sup>®</sup> GR-HI</b>	Silicone compound with hardened top surface	Same as above, except hardened top surface facilitates handling and installation during complex assemblies.
<b>Sarcon<sup>®</sup> GR-FI</b>	Silicone compound with mesh embedded overall	Same as Sarcon GR-I, except nylon mesh reinforcement prevents stretching.
<b>Sarcon<sup>®</sup> GR-HFI</b>	Silicone compound with hardened top surface and mesh embedded overall	Same as Sarcon GR-I, except hardened top surface facilitates handling and installation during complex assemblies; nylon mesh reinforcement prevents stretching.

\*Thicknesses available : GR-I , GR-HI : 0.5mm, 1.0mm, 1.5mm, 2.0mm, 2.5mm, 3.0mm  
GR-FI , GR-HFI : 0.5mm, 1.0mm

\*Can be designed for custom applications. (Cutting. Punching)

\*Flame retardant silicone polymer filled with an special organic substance.

#### 4] Types and Configuration.

**Table - 2**

<b>Series</b>	<b>Product Description</b>	<b>Width x Length</b>	<b>Thickness</b>
<b>Sarcon® GR-I</b>	Sarcon® <b>50G-I</b>	Usable size 280mm x 180mm (11" x 7.1" )	0.5mm ± 0.1mm
	Sarcon® <b>100G-I</b>		1.0mm ± 0.2mm
	Sarcon® <b>150G-I</b>	Actual size 300mm x 200mm (11.8" x 7.8" )	1.5mm ± 0.2mm
	Sarcon® <b>200G-I</b>		2.0mm ± 0.3mm
	Sarcon® <b>250G-I</b>		2.5mm ± 0.3mm
	Sarcon® <b>300G-I</b>		3.0mm ± 0.3mm
<b>Sarcon® GR-HI</b>	Sarcon® <b>50G-HI</b>	Usable size 280mm x 180mm (11" x 7.1" )	0.5mm ± 0.1mm
	Sarcon® <b>100G-HI</b>		1.0mm ± 0.2mm
	Sarcon® <b>150G-HI</b>	Actual size 300mm x 200mm (11.8" x 7.8" )	1.5mm ± 0.2mm
	Sarcon® <b>200G-HI</b>		2.0mm ± 0.3mm
	Sarcon® <b>250G-HI</b>		2.5mm ± 0.3mm
	Sarcon® <b>300G-HI</b>		3.0mm ± 0.3mm
<b>Sarcon® GR-FI</b>	Sarcon® <b>50G-FI</b>	Usable size 280mm x 180mm (11" x 7.1" )	0.5mm ± 0.1mm
	Sarcon® <b>100G-FI</b>		1.0mm ± 0.2mm
		Actual size 300mm x 200mm (11.8" x 7.8" )	
<b>Sarcon® GR-HFI</b>	Sarcon® <b>50G-HFI</b>	Usable size 280mm x 180mm (11" x 7.1" )	0.5mm ± 0.1mm
	Sarcon® <b>100G-HFI</b>		1.0mm ± 0.2mm
		Actual size 300mm x 200mm (11.8" x 7.8" )	

**Notice.**

1) Standard Product Form.

Sarcon GR-I® series is placed between PET (polyester) Film and special polyethylene Film, Kisscut into the required shape.

## 5] Typical Properties.

Table - 3

Property	Unit	GR-I	GR-HI	GR-FI	GR-HFI	Test Method	Specimen
Color	—	Gray	Gray	Gray	Gray	Visual	—
Operating Temp. range	°C	-60 ~ +200	-60 ~ +200	-60 ~ +200	-60 ~ +200	—	—
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.7	JIS-K-6220 ASTM D-792	A
Hardness	ASKER-C (Shore 00)	26 (53)	26 (53)	26 (53)	26 (53)	JIS-K-7312 ASTM D-2240	B (—)
Tensile Strength	(MPa)	0.2	0.2	0.8	0.8	JIS-K-6251 (#2) ASTM D-412	A
Elongation	%	64	32	40	30	JIS-K-6251 (#2) ASTM D-412	A
Tear Resistance	(KN/m)	1	1	3	3	JIS-K-6252 (Angle) ASTM D-624	A
Volume Resistivity	(Mohms·m)	2.5 x 10 <sup>4</sup>	2.4 x 10 <sup>4</sup>	3.6 x 10 <sup>4</sup>	3.1 x 10 <sup>4</sup>	JIS-K-6249 ASTM D-257	C
Breakdown Voltage	(KV/mm)	13	15	13	19	JIS-K-6249 ASTM D-149	C
Withstand Voltage	(KV/mm)	7	10	8	10	JIS-K-6249 ASTM D-149	C

Remarks / Specimen A : 2.0mm Thickness.

Specimen B : 60mm Width x 120mm Length x 20mm Thickness.

Specimen C : 120mm Width x 120mm Length x 1.0mm Thickness.

## 6] Thermal Properties.

### 1) Thermal Resistance.

(Unit : °C·inch<sup>2</sup>/ watt) Table - 4

Thickness	GR-I	GR-HI	GR-FI	GR-HFI
0.5mm	0.42	0.59	0.52	0.67
1.0mm	0.76	0.93	0.90	1.02
1.5mm	1.00	1.17		
2.0mm	1.20	1.41		
2.5mm	1.42	1.76		
3.0mm	1.68	1.88		

Test Method : Fujipoly test method FTM P-3020 which gives ASTM D5470 equivalent value.

### 2) Thermal Conductivity.

Table - 5

	Unit	GR-I	GR-HI	GR-FI	GR-HFI
Thermal Conductivity	watt / m·k	2.80	2.80	2.80	2.80

Test Method : Fujipoly test method FTM P-1620 (JIS R2618 / ASTM D2326 equivalent)

## 7] Heat Aging Test.

1) Test Condition : 70°C (158°F) x 1,000hrs (42 days)

### Sarcon® GR-I

Table - 6

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.9	JIS-K-6220	A
Hardness	ASKER-C	(26)	(26)	(26)	(26)	JIS-K-7312	B
Tensile Strength	(MPa)	0.2	0.2	0.2	0.2	JIS-K-6251 (#2)	A
Elongation	%	64	59	50	40	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	2.5 x 10 <sup>4</sup>	3.8 x 10 <sup>4</sup>	4.0 x 10 <sup>4</sup>	5.1 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	13	14	14	14	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

### Sarcon® GR-HI

Table - 7

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.9	JIS-K-6220	A
Hardness	ASKER-C	(26)	(25)	(25)	(25)	JIS-K-7312	B
Tensile Strength	(MPa)	0.2	0.2	0.2	0.2	JIS-K-6251 (#2)	A
Elongation	%	32	32	32	30	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	2.4 x 10 <sup>4</sup>	3.9 x 10 <sup>4</sup>	5.0 x 10 <sup>4</sup>	5.0 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	15	17	17	17	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

### Sarcon® GR-FI

Table - 8

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.8	JIS-K-6220	A
Hardness	ASKER-C	(26)	(25)	(26)	(26)	JIS-K-7312	B
Tensile Strength	(MPa)	0.8	0.8	0.9	0.8	JIS-K-6251 (#2)	A
Elongation	%	40	40	30	29	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	3	4	3	3	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	3.6 x 10 <sup>4</sup>	3.6 x 10 <sup>4</sup>	3.6 x 10 <sup>4</sup>	4.3 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	13	10	15	19	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

### Sarcon® GR-HFI

Table - 9

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.8	2.8	JIS-K-6220	A
Hardness	ASKER-C	(26)	(25)	(25)	(25)	JIS-K-7312	B
Tensile Strength	(MPa)	0.8	0.9	0.8	0.8	JIS-K-6251 (#2)	A
Elongation	%	30	30	30	30	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	3	3	3	5	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	3.1 x 10 <sup>4</sup>	3.7 x 10 <sup>4</sup>	4.5 x 10 <sup>4</sup>	4.8 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	19	19	19	19	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

Remarks / Specimen A : 2.0mT

Specimen B : 60mm Width x 120mm Length x 20mm Thickness. (GR-I for all products)

Specimen C : 120mm Width x 120mm Length x 1.0mm Thickness.

2) Test Condition : 150°C (302°F) x 1,000hrs (42 days)

**Sarcon® GR-I**

**Table - 10**

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.8	2.8	JIS-K-6220	A
Hardness	ASKER-C	(26)	(27)	(31)	(34)	JIS-K-7312	B
Tensile Strength	(MPa)	0.2	0.2	0.2	0.2	JIS-K-6251 (#2)	A
Elongation	%	64	37	35	10	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms·m)	2.5 x 10 <sup>4</sup>	6.0 x 10 <sup>4</sup>	2.0 x 10 <sup>5</sup>	3.2 x 10 <sup>5</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	13	15	17	17	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

**Sarcon® GR-HI**

**Table - 11**

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.8	2.8	2.8	JIS-K-6220	A
Hardness	ASKER-C	(26)	(27)	(31)	(34)	JIS-K-7312	B
Tensile Strength	(MPa)	0.2	0.2	0.3	0.3	JIS-K-6251 (#2)	A
Elongation	%	32	34	25	15	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms·m)	2.4 x 10 <sup>4</sup>	7.0 x 10 <sup>4</sup>	3.5 x 10 <sup>5</sup>	4.0 x 10 <sup>5</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	15	15	17	17	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

**Sarcon® GR-FI**

**Table - 12**

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.8	JIS-K-6220	A
Hardness	ASKER-C	(26)	(27)	(31)	(34)	JIS-K-7312	B
Tensile Strength	(MPa)	0.8	0.4	0.4	0.2	JIS-K-6251 (#2)	A
Elongation	%	40	23	20	14	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	3	2	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms·m)	3.6 x 10 <sup>4</sup>	6.6 x 10 <sup>4</sup>	2.6 x 10 <sup>5</sup>	5.1 x 10 <sup>5</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	13	15	17	13	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

**Sarcon® GR-HFI**

**Table - 13**

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.8	2.8	JIS-K-6220	A
Hardness	ASKER-C	(26)	(27)	(31)	(34)	JIS-K-7312	B
Tensile Strength	(MPa)	0.8	0.6	0.2	0.2	JIS-K-6251 (#2)	A
Elongation	%	30	15	15	15	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	3	2	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms·m)	3.1 x 10 <sup>4</sup>	7.8 x 10 <sup>4</sup>	4.6 x 10 <sup>5</sup>	7.0 x 10 <sup>5</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	19	19	19	19	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

Remarks / Specimen A : 2.0mT

Specimen B : 60mm Width x 120mm Length x 20mm Thickness. (GR-I for all products)

Specimen C : 120mm Width x 120mm Length x 1.0mm Thickness.

## 8] Humidity Test.

Test Condition : 60°C (140°F) x 1,000hrs(42 days) x 90%RH

### Sarcon® GR-I

Table - 14

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.9	JIS-K-6220	A
Hardness	ASKER-C	(26)	(26)	(26)	(27)	JIS-K-7312	B
Tensile Strength	(MPa)	0.2	0.2	0.2	0.2	JIS-K-6251 (#2)	A
Elongation	%	64	66	50	35	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	2.5 x 10 <sup>4</sup>	3.8 x 10 <sup>4</sup>	5.7 x 10 <sup>4</sup>	6.3 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	13	14	14	14	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

### Sarcon® GR-HI

Table - 15

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.9	JIS-K-6220	A
Hardness	ASKER-C	(26)	(26)	(26)	(27)	JIS-K-7312	B
Tensile Strength	(MPa)	0.2	0.2	0.2	0.2	JIS-K-6251 (#2)	A
Elongation	%	32	34	34	34	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	2.4 x 10 <sup>4</sup>	4.0 x 10 <sup>4</sup>	6.1 x 10 <sup>4</sup>	9.7 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	15	16	16	16	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

### Sarcon® GR-FI

Table - 16

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.8	JIS-K-6220	A
Hardness	ASKER-C	(26)	(26)	(26)	(27)	JIS-K-7312	B
Tensile Strength	(MPa)	0.8	0.9	0.5	0.5	JIS-K-6251 (#2)	A
Elongation	%	40	45	40	35	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	3	3	3	3	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	3.6 x 10 <sup>4</sup>	3.6 x 10 <sup>4</sup>	3.6 x 10 <sup>4</sup>	3.4 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	13	12	13	13	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

### Sarcon® GR-HFI

Table - 17

Property	Unit	Initial	100Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	gr/cm <sup>3</sup>	2.7	2.7	2.7	2.7	JIS-K-6220	A
Hardness	ASKER-C	(26)	(26)	(26)	(27)	JIS-K-7312	B
Tensile Strength	(MPa)	0.8	0.9	0.6	0.6	JIS-K-6251 (#2)	A
Elongation	%	30	30	30	30	JIS-K-6251 (#2)	A
Tear Resistance	(KN/m)	3	3	3	4	JIS-K-6252 (Angle)	A
Volume Resistivity	(Mohms-m)	3.1 x 10 <sup>4</sup>	3.3 x 10 <sup>4</sup>	3.5 x 10 <sup>4</sup>	5.0 x 10 <sup>4</sup>	JIS-K-6249	C
Breakdown Voltage	(KV/mm)	19	19	19	19	JIS-K-6249	C
Thermal Conductivity	W/m-k	(2.8)	(2.8)	(2.8)	(2.8)	JIS-R-2618 equivalent	C

Remarks / Specimen A : 2.0mT

Specimen B : 60mm Width x 120mm Length x 20mm Thickness. (GR-I for all products)

Specimen C : 120mm Width x 120mm Length x 1.0mm Thickness.



## 9] Mechanical Property / Compression VS Compression Load

**Sarcon® GR-I** (Unit : Kgf / inch<sup>2</sup>) **Table - 18**

	50G-I	100G-I	150G-I	200G-I	250G-I	300G-I
10%	12	11	9	6	6	5
20%	31	22	18	15	14	12
30%	47	38	33	30	27	25
40%	65	59	54	49	44	42
50%	86	84	79	75	67	64
sustain 50%	52	44	42	40	36	35

**Sarcon® GR-HI** (Unit : Kgf / inch<sup>2</sup>) **Table - 19**

	50G-HI	100G-HI	150G-HI	200G-HI	250G-HI	300G-HI
10%	18	16	13	9	8	7
20%	40	32	29	22	20	20
30%	61	56	55	41	40	38
40%	89	86	74	64	62	61
50%	126	114	109	91	86	86
sustain 50%	97	92	81	55	50	45

**Sarcon® GR-FI** (Unit : Kgf / inch<sup>2</sup>) **Table - 20**

	50G-FI	100G-FI	
10%	20	17	
20%	45	43	
30%	76	70	
40%	113	101	
50%	153	125	
sustain 50%	115	104	

**Sarcon® GR-HFI** (Unit : Kgf / inch<sup>2</sup>) **Table - 21**

	50G-HFI	100G-HFI	
10%	23	19	
20%	50	46	
30%	82	73	
40%	121	103	
50%	163	136	
sustain 50%	127	110	

Remarks / Test Method : Fujipoly Test Method

Compression Velocity 5.0mm / minute with 200Kgf load

Compression Area 6.25cm<sup>2</sup> (25mm x 25mm)

Sustain 50% at One minute after

**10] Extractable Volatiles.**

**Table - 22**

<b>D<sub>n</sub></b>	<b>Sarcon® GR-I</b>	<b>Test Method</b>
<b>D<sub>4</sub> ~ D<sub>10</sub></b>	Less than 0.0010wt %	Gas Chromatographic Analysis by Abstracting Carbon tetrachloride
<b>D<sub>10</sub> ~ D<sub>20</sub></b>	0.0039wt %	
<b>Total Less D<sub>20</sub></b>	0.0039wt %	
<b>Bellcore Test</b>	Passed Bellcore Specification TR-NWT000930	

**11] Flame Retardancy.**

**Table - 23**

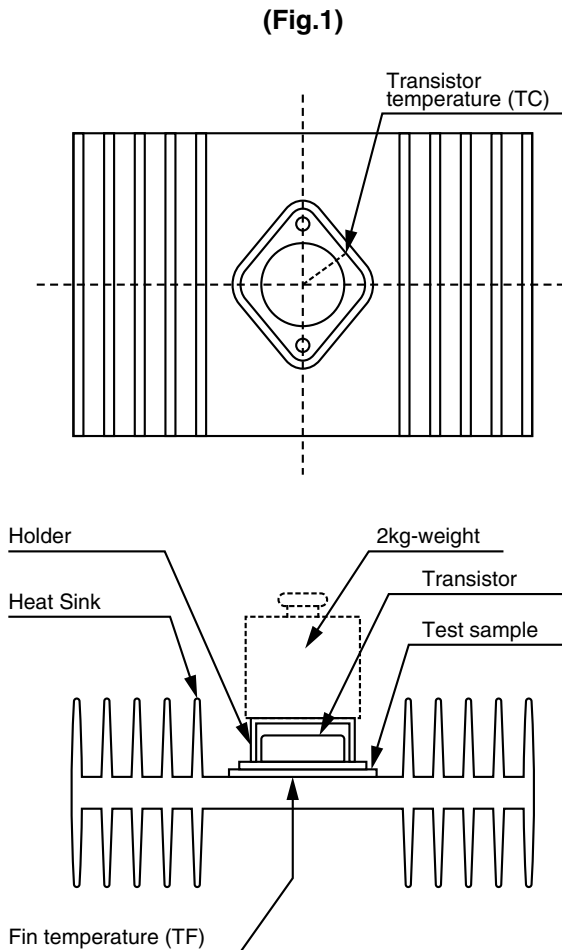
<b>Series</b>	<b>Product Description</b>	<b>UL94</b>	<b>Series</b>	<b>Product Description</b>	<b>UL94</b>
<b>Sarcon® GR-I</b>	Sarcon <b>50G-I</b>	94V - 0	<b>Sarcon® GR-HI</b>	Sarcon <b>50G-HI</b>	94V - 0
	Sarcon <b>100G-I</b>	94V - 0		Sarcon <b>100G-HI</b>	94V - 0
	Sarcon <b>150G-I</b>	94V - 0		Sarcon <b>150G-HI</b>	94V - 0
	Sarcon <b>200G-I</b>	94V - 0		Sarcon <b>200G-HI</b>	94V - 0
	Sarcon <b>250G-I</b>	94V - 0		Sarcon <b>250G-HI</b>	94V - 0
	Sarcon <b>300G-I</b>	94V - 0		Sarcon <b>300G-HI</b>	94V - 0
<b>Sarcon® GR-FI</b>	Sarcon <b>50G-FI</b>	94V - 0	<b>Sarcon® GR-HFI</b>	Sarcon <b>50G-HFI</b>	94V - 0
	Sarcon <b>100G-FI</b>	94V - 0		Sarcon <b>100G-HFI</b>	94V - 0

## 12] Test Method for Sarcon® GR-I products.

### 1) Thermal Resistance.

**Test method :** Fujipoly test method FTM P-3020 which gives ASTM D5470 equivalent value.

- 1) Punched-out specimen in TO-3 package is located between a transistor and heat sink.  
(Fig.1)
- 2) The transistor is covered with resin holder and added 2kg -weight as a load.
- 3) DC 10V, 2A (20W) current is applied to the transistor.
- 4) After three minutes, the thermal resistance is calculated based on the following formula.



### Test Apparatus

Transistor : 2SC2245

Heat Sink : 40CH104L-90-K  
(manufactured by Ryosan Co., Ltd)

Heat Sensor : 2SC1-OHK300 x 532W x JOO2Y  
(manufactured by Chino Co., Ltd)

Condition : 25°C 60%RH

Formula for Thermal resistance calculation.

$$R_t = (T_c - T_f) / P_C$$

$R_t$  : Thermal resistance ( $^{\circ}\text{C}\cdot\text{inch}^2 / \text{watt}$ )  
 $T_c$  : Transistor temperature  $^{\circ}\text{C}$   
 $T_f$  : Heat sink temperature  $^{\circ}\text{C}$   
 $P_C$  : Power applied to transistor

## 2) Gas Chromatography Analysis.

### [Test method]

[The preprocessing]

(sample) It measures 1-g weight.

Extraction solvent : Carbon tetrachloride 10ml.  
(The inner standard material.)

The immersion and leaving 16Hrs ≤.

It measures extracts by gas chromatography analysis.

[The measurement condition]

model : SHIMAZU SEISAKUSHO Co., Ltd. GC-12A

detector : FID (The hydrogen flame ionization detector.)

column : OV-17 (3m)

column temperature : 60°C · 2min temperature-programmed 16°C / min maintenance 300°C

ventage temperature : 280°C

carrier gas flow rate : 40ml / min

inculcating quantity : 2μl

## 13] Other Technical Information and Design Guide.

**Fuji Poly website** <http://www.fujipoly.com>

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