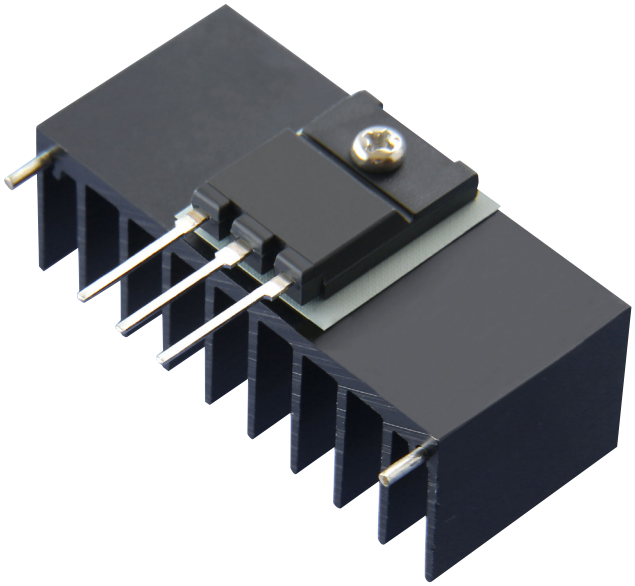
KØLEPROFILER

TERMISK LEDENDE MATERIALE



SARCON®
OVERSIGT

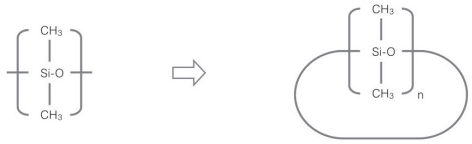
NEWTRONIC

VOLATILE COMPONENTS OF SARCON® SERIES

1. VOLATILE COMPONENTS OF SILICONE MATERIALS

The volatile materials from silicone elastomers generally include low-molecular siloxane, moisture and cross-linker. It is very difficult to measure the volume of the moisture or the cross-linker because their amounts in Silicone are too low to be measured. Therefore, we only show the content of low-molecular siloxane. All silicone elastomers contain some low-molecular siloxanesuch as 04~020 (see Fig-1), whose contents are dependent upon each specific manufacturing process or raw materials being used.

(Fig.1: The low-molecular siloxane chemical formula)



D1: Dimethylsiloxane: $(CH_3)_2SiO$

Dn: Cyclic polydimethylsiloxane: $[(CH_3)_2SiO]$ n

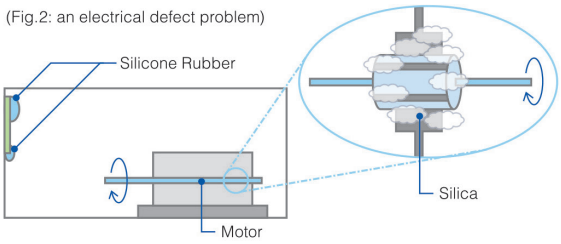
* An electrical contact failure is, in most cases, caused by a high content ol the D13 ar lower.
*The clouding effect af glass ar mirror surface is, in most cases, caused by a high content af siloxane which is greater than D13.

We usually post-cure the produet, or use volatility-controlled raw material to reduce low-molecular siloxane to a sufficiently low level.
SARCON® series is made of the volatility-controlled silicone elastomers.

2. EFFECT OF LOW VOLATILE SILOXANE

In the 1980's, there was an electrical defect problem when a motor and a silicone rubber were in closed space or semi closed space. Alter the investigation, il was found thai silica was generated around the electrical contact part due to sparking, and then an electrical defect was caused. The volatile components of siloxane are cracked by the spark on the motor then the silica is generated.

(Fig.2: an electrical defect problem)



3. CONTENTS OF THE LOW-MOLECULAR SILOXANE IN SARCON® GR ▪ XR SERIES (D4~D20 BY WT O/O)

[Table-1: Typical measurement value]

	RTV *1 (General type)	RTV (C.V. type) *2	SARCON® XR-m	SARCON® GR130A
	0.2~1.2	0.01~0.06	0.0010	0.0194
	SARCON® XR-Um	SARCON® GR80A	SARCON® GR-ae	SARCON® GR-Pm
Dn (wt %) D 4~20 Total	0.0010	0.0010	0.0010	0.0026
	SARCON® GR25A	SARCON® GR14A	SARCON® GR45A	SARCON® EGR-11F
	0.0028	0.0034	0.0046	0.0071
	SARCON® PG25A	SARCON® PG45A	SARCON® PG80A	
	0.0143	D 4~10 Total 0.0010 D 11~20 Total 0.0328	0.0158	

*1: RTV: Room Temperature Vulcanizing silicone rubber *2: C.V.: Controlled Volatility type

4. CONTENTS OF THE LOW-MOLECULAR SILOXANE IN SARCON® SPG SERIES (D4~D20 BY WT O/O)

[Table-2: Typical measurement value]

Dn (wt %) D 4~20 Total	SARCON® SPG-20B	SARCON® SPG-30B	SARCON® SPG-50A
	0.0010	0.0010	0.0043

Test method: Gas Chromatographic Analysis by the extraction, Solvent

- Analytical instrument: GC-14
- Column: DB-1701 (30 m x 0.53 mm I.D)
- Column Temp: 50 °C(122°F) / 2 min hold → 300°C(572°F) / rate of increase = 10°C(50°F)/min
- Detector: FID (Flame Ionization Detector)
- Injection Temp: 50 °C(122°F)/30sec → 270°C(518°F)
- Syringe Volumes: 2μL
- Detection limits: 0.0010wt%

SILICONE OIL CONTENT OF SARCON® SERIES

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BELLCORE TEST

• Reference: Bellcore TR-NWT-000930, section 10.3
• Results:

Material	Extractable Residue (%)	TR-NWT-000930*1
TR	2.07	Pass
HR	1.26	Pass
YR-a	1.23	Pass
YR-c	3.75	Pass
GR-ae	14.23	Pass
GR14A	12.50	Pass
GR25A	8.38	Pass
GR45A	4.73	Pass
GR80A	4.02	Pass
GR130A	3.67	Pass
PG25A	8.25	Pass
PG45A	3.41	Pass
GR-Pm	6.60	Pass
EGR-11F	8.07	Pass

*1 The extractable residue shall be less than 7 weight percent; or less than 18 weight percent if the viscosity of the residue is greater than 1,000 cp. The requirements are based on room temperature extraction in hexane.

METHOD

Between one and live grams of each submitted sample was cut into small sections befare being placed into a clean, pre-weighed flask labeled "Sample Flask" along with 100ml of hexane. The !lask was then stoppered up for a period of at least twelve hours. The solution from this initial flask was then poured into a second clean and pre-weighed flask labeled "Residue Flask" which was then placed into a water bath at 80°C for one hour to distill off the hexane. Upon completion of the water bath exposure, all sets of the flasks were baked in an oven for one hour at 100'C to ensure the complete evaporation of the hexane. The final mass of each !lask was then recorded such thai an amount of "extractable" silicone could be calculated for each sample. (Note: Any extracted "mass" was assumed to be silicone.)

• Soxhlet Extraction for PG80A:

Material	Extractable Residue (%)
PG80A	4.30
XR-m	3.57

Unmeasurable silicone oil content of PG80A by Bellcore Test. Therefore it was measured by Fujipoly Original Soxhlet Extraction with toluene, extraction time for twety-four hours.

OUTGASSING AND TOTAL MASS LOSS AT SARCON® SERIES

OUTGAS TEST

• Reference: ASTM E595
• Results:

Material	Total Mass Loss (%)	Collected Volatile Condensable Material (%)	Water Vapor Recovered (%)
TR	0.19	0.03	0.04
HR	0.16	< 0.01	0.03
YR-a	0.09	< 0.01	0.02
YR-c	0.06	< 0.01	0.03
GR-ae	0.04	< 0.01	0.01
GR14A	0.04	< 0.01	0.01
GR25A	0.07	0.01	0.01
GR45A	0.04	0.02	0.03
GR80A	0.07	< 0.01	0.03
GR130A	0.10	0.02	0.02
XR-m	0.07	0.03	0.02
PG25A	0.11	0.01	0.03
PG45A	0.04	0.04	0.04
GR-Pm	0.09	0.03	0.02
PG80A	0.07	0.02	0.02

METHOD

Random areas were carefully removed from the test specimen and weighed. The specimen was placed in a preformed, degreased container (boa!) and was then conditioned at 23'C and 50% relative humidity for 24 hours. Alter conditioning, the boa! and the specimen were weighed and placed in the specimen compartment in a copper healing-bar thai is part of the test apparatus. The copper healing-bar was then placed in the vacuum chamber, which was !hen sealed. The vacuum chamber was evacuated to a vacuum of at least 5.0 x 10 -5 torr. The healing-bar was raised to a temperature of 125'C. This caused the vapor from the heated specimen to stream from the hole in the specimen compartment. The vapor passed through the collector chamber where the vapor condensed on a previously-weighed and independently temperature-controlled, chromium-plated collector plate thai was maintained at 25'C. After 24 hours, the test apparatus was cooled and the vacuum chamber was then re-pressurized with a dry, inert gas. The specimen and the collector plates were weighed. The TML and CVCM percentages were then determined. After the specimen was weighed to determine the TML, the WVR was determined by conditioning the specimen at 23'C with 50% relative humidity for 24 hours. The specimen was again weighed and the WVR was calculated.

RELIABILITY OF OF SARCON® SERIES

NEWTRONIC

SARCON® TR(30TR)

Test Properties	unit	initial	150°C After 1,000hrs	200°C After 1,000hrs	60°C / 100%RH After 500hrs
Hardness	IRHD	75	83	90	73
Tensile Strength	Mpa	4.8	5.0	5.9	–
Elongation	%	100	50	30	–
Volume Resistivity	Ohm-m	$2.9x10^{12}$	$5.6x10^{13}$	$7.2x10^{13}$	$6.1x10^{11}$
Breakdown Voltage	kV	10	8	8	6

SARCON® HR (30HR)

Test Properties	unit	initial	150°C After 1,000hrs	200°C After 1,000hrs	60°C / 100%RH After 500hrs
Hardness	IRHD	93	94	98	86
Tensile Strength	Mpa	5.6	3.9	5.6	–
Elongation	%	60	25	25	–
Volume Resistivity	Ohm-m	$9.0x10^{13}$	$1.0x10^{13}$	$9.4x10^{13}$	$2.4x10^{11}$
Breakdown Voltage	kV	9	7	7	4

SARCON® YR-a (30Y-a)

Test Properties	unit	initial	150°C After 1,000hrs	200°C After 1,000hrs	60°C / 95%RH After 500hrs
Hardness	IRHD	86	94	99	89
Tensile Strength	Mpa	4.5	5.3	5.6	4.5
Elongation	%	73	40	20	75
Volume Resistivity	Ohm-m	$1.0x10^{13}$	$1.0x10^{13}$	$3.0x10^{13}$	$3.0x10^{12}$
Breakdown Voltage	kV	10	10	10	10

SARCON® YR-c (20Y-c)

Test Properties	unit	initial	150°C After 1,000hrs	200°C After 1,000hrs	60°C / 95%RH After 1,000hrs
Hardness	IRHD	75	90	97	70
Tensile Strength	Mpa	2.0	3.6	4.5	1.7
Elongation	%	50	29	13	52
Volume Resistivity	Ohm-m	$2.0x10^{13}$	$3.0x10^{13}$	$3.0x10^{13}$	$2.0x10^{13}$
Breakdown Voltage	kV	7	7	7	6

SARCON® GTR (15GTR)

Test Properties	unit	initial	150°C After 1,000hrs	200°C After 1,000hrs	60°C / 100%RH After 500hrs
Hardness	IRHD	87	87	88	87
Tensile Strength	Mpa	71.9	59.5	43.1	–
Elongation	%	2 or less	2 or less	2 or less	–
Volume Resistivity	Ohm-m	$5.7x10^{13}$	$9.1x10^{13}$	$1.1x10^{13}$	$9.1x10^{11}$
Breakdown Voltage	kV	4	4	3	3

SARCON® GHR (15GHR)

Test Properties	unit	initial	150°C After 1,000hrs	200°C After 1,000hrs	60°C / 100%RH After 500hrs
Hardness	IRHD	92	92	94	92
Tensile Strength	Mpa	52.3	51.0	38.5	–
Elongation	%	2 or less	2 or less	2 or less	–
Volume Resistivity	Ohm-m	$1.1x10^{13}$	$1.8x10^{14}$	$1.8x10^{14}$	$3.2x10^{10}$
Breakdown Voltage	kV	3	3	3	3

SARCON® GSR (20GSR)

Test Properties	unit	initial	150°C After 1,000hrs	60°C / 95%RH After 500hrs
Hardness	IRHD	90	88	85
Tensile Strength	Mpa	68.6	29.4	78.4
Elongation	%	3 or less	3 or less	3 or less
Volume Resistivity	Ohm-m	$2.9x10^{13}$	$2.6x10^{13}$	$8.4x10^{13}$
Breakdown Voltage	kV	6	6	5

SARCON® GAR (20GAR)

Test Properties	unit	initial	150°C After 1,000hrs	60°C / 95%RH After 1,000hrs
Hardness	IRHD	80	96	81
Tensile Strength	Mpa	9.7	10.3	6.3
Elongation	%	3 or less	3 or less	3 or less
Volume Resistivity	Ohm-m	$2.0x10^{15}$	$2.8x10^{15}$	$1.3x10^{15}$
Breakdown Voltage	kV	10	11	11
Dielectric Strength	kV	9	9	9

SARCON® GR-ae

Test Properties	unit	initial	70°C After 2,000hrs	150°C After 2,000hrs	60°C / 95%RH After 2,000hrs	-40°C(30min) ↔ +125°C(30min) After 2,000hrs
Specific Gravity	-	2.0	2.0	2.0	2.0	2.0
Hardness	ASKER C	5	5	6	5	24
Breakdown Voltage	kV/mm	17	20	24	20	24
Thermal Conductivity	W/m-K	1.3	1.3	1.3	1.3	1.3

SARCON® GR14A

Test Properties	unit	initial	70°C After 1,000hrs	150°C After 1,000hrs	60°C / 95%RH After 1,000hrs	–40°C After 1,000hrs	-40°C(30min) ↔ +125°C(30min) After 1,000hrs
Specific Gravity	-	2.0	2.0	2.0	2.0	2.0	2.0
Hardness	Shore 00	25	28	30	27	27	30
Breakdown Voltage	kV/mm	14	14	17	14	14	17
Thermal Conductivity	W/m-K	1.4	1.4	1.4	1.4	1.4	1.3

SARCON® GR25A

Test Properties	unit	initial	70°C After 1,000hrs	150°C After 1,000hrs	60°C / 95%RH After 1,000hrs	–40°C After 1,000hrs	-40°C(30min) ↔ +125°C(30min) After 1,000hrs
Specific Gravity	-	2.6	2.6	2.6	2.6	2.6	2.6
Hardness	ASKER C	18	14	27	13	17	15
Breakdown Voltage	kV/mm	15	15	19	14	15	15
Thermal Conductivity	W/m-K	2.5	2.5	2.5	2.5	2.5	2.5

SARCON® GR45A

Test Properties		unit	initial	70°C After 1,000hrs	150°C After 1,000hrs	60°C / 95%RH After 1,000hrs	–40°C After 1,000hrs	-40°C(30min) ↔ +125°C(30min) After 1,000hrs
Specific Gravity		-	3.2	3.2	3.2	3.2	3.2	3.2
Hardness	less than 1.5mmT	Shore 00	60	64	85	61	60	69
	1.5mmT or more		45	44	85	50	45	54
Breakdown Voltage		kV/mm	17	18	20	17	16	19
Thermal Conductivity		W/m-K	4.5	4.6	4.8	4.6	4.8	4.6

SARCON® GR80A

Test Properties	unit	initial	70°C After 1,000hrs	150°C After 1,000hrs	60°C / 90%RH After 1,000hrs	–40°C After 1,000hrs	-40°C(30min) ↔ +125°C(30min) After 1,000hrs
Specific Gravity	-	3.3	3.3	3.3	3.3	3.3	3.3
Hardness	Shore 00	75	72	92	80	70	70
Volume Resistivity	Ohm-m	$2.4x10^{11}$	$2.8x10^{11}$	$1.8x10^{13}$	$3.7x10^{11}$	$2.6x10^{11}$	$1.3x10^{12}$
Breakdown Voltage	kV/mm	15	14	20	17	15	17
Thermal Conductivity	W/m-K	8.0	8.0	8.0	8.0	8.0	8.0

SARCON® XR-m

Test Properties	unit	initial	70°C After 1,000hrs	150°C After 1,000hrs	60°C / 90%RH After 1,000hrs
Specific Gravity	-	3.2	3.2	3.2	3.2
Hardness	ASKER C	46	54	62	53
Breakdown Voltage	kV/mm	10	10	10	9
Thermal Conductivity	W/m-K	17	17	17	17

SARCON® GR130A

Test Properties	unit	initial	70°C After 1,000hrs	150°C After 1,000hrs	60°C / 95%RH After 1,000hrs	–40°C After 1,000hrs	-40°C(30min) ↔ +125°C(30min) After 1,000hrs
Specific Gravity	-	3.0	3	2.9	3	3	3
Hardness	Shore 00	74	80	94	89	74	91
Breakdown Voltage	kV/mm	14	16	18	18	13	17
Thermal Resistance	K-cm²/W	–*	-0.04	0.08	0	0.04	-0.02

*Compared to the initial value

SARCON® PG25A

Test Properties	unit	initial	70°C	150°C	60°C / 95%RH	−40°C	-40°C(30min) ↔ +125°C(30min)
			After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Specific Gravity	-	2.6	2.6	2.6	2.6	2.6	2.6
Hardness	ASKER C	8	16	43	8	8	47
Breakdown Voltage	kV/mm	18	17	21	16	16	19
Thermal Conductivity	W/m-K	2.5	2.5	2.5	2.5	2.5	2.5

SARCON® PG45A

Test Properties	unit	initial	70°C	150°C	60°C / 95%RH	−40°C	-40°C(30min) ↔ +125°C(30min)
			After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Specific Gravity	-	3.3	3.3	3.3	3.3	3.3	3.3
Thermal Conductivity	W/m-K	4.6	4.7	4.8	4.6	4.5	4.6
Thermal Resistance	K-cm²/W	0.9	0.9	1.0	0.9	1.0	1.0

SARCON® GR-Pm

Test Properties	unit	Compression Ratio	initial	70°C	150°C	60°C / 90%RH	-40°C(30min) ↔ +125°C(30min)
				After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Thermal Resistance	K-cm²/W	30%	1.7	1.8	2.3	1.7	1.8
		70%	0.9	0.9	1.3	0.9	1.1
		90%	0.5	0.4	0.4	0.6	0.4

SARCON® PG80A

Test Properties	unit	Compression Ratio	initial	70°C	150°C	60°C / 95%RH	-40°C(30min) ↔ +125°C(30min)
				After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Thermal Resistance	K-cm²/W	30%	0.83	0.82	0.86	0.71	0.75
		70%	0.48	0.48	0.55	0.50	0.43

SARCON® XR-Um

Test Properties	unit	Specimen	initial	120°C	150°C	85°C / 85%RH	-40°C(30min) ↔ +125°C(30min)
				After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Thermal Resistance	K-cm²/W	20X-Um	0.20	0.21	0.26	0.22	0.19
		40X-Um	0.29	0.30	0.37	0.30	0.31

SARCON® SPG-20B

Test Properties	unit	Gap	initial	70°C	150°C	60°C / 95%RH	−40°C	-40°C(30min) ↔ +125°C(30min)
				After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Thermal Resistance	K-cm²/W	0.5mm/0.020in	1.6	1.6	1.6	1.5	1.6	1.5

SARCON® SPG-30B

Test Properties	unit	Gap	initial	70°C	150°C	60°C / 95%RH	−40°C	-40°C(30min) ↔ +125°C(30min)
				After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Thermal Resistance	K-cm²/W	1.0mm/0.039in	2.5	2.5	2.4	2.4	2.5	2.4

SARCON® SPG-50A

Test Properties	unit	Gap	initial	70°C	150°C	60°C / 95%RH	−40°C	-40°C(30min) ↔ +125°C(30min)
				After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Thermal Resistance	K-cm²/W	0.5mm/0.020in	0.9	1.0	1.2	1.1	0.9	0.9
		1.0mm/0.039in	1.7	1.8	1.8	1.8	1.7	1.7

SARCON® NR-c

Test Properties	unit	initial	80°C	125°C	85°C / 85%RH	−40°C	-40°C(30min) ↔ +85°C(30min)
			After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs	After 1,000hrs
Specific Gravity	-	2.1	2.1	2.2	2.1	2.1	2.1
Hardness	ASKER C	27	30	57	28	37	37
Breakdown Voltage	kV/mm	11	18	26	15	27	27
Thermal Conductivity	K-cm²/W	6.8	7.5	9.9	7.3	10.4	10.4

Test Properties	Test Method
Hardness	IRHD : ISO 7619
	Shore OO : ASTM D2240
	ASKER C : JIS K7312
Tensile Strength	ASTM D412 / 1458
Elongation	ASTM D412 / 1458
Volume Resistivity	ASTM D257
Breakdown Voltage	ASTM D149
Dielectric Strength	ASTM D149
Specific Gravity	ASTM D792
Thermal Conductivity	ASTM D5470 modified
Thermal Resistance	ASTM D5470 modified

Reduced Temperature
-40°C = -40°F
60°C = 140°F
70°C = 158°F
80°C = 176°F
85°C = 185°F
125°C = 257°F
150°C = 302°F
200°C = 390°F

THICKNESS OF SARCON® MATERIALS /

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SARCON®	Construction	Thickness (mm)	Sheet (mm)
TR	30T	0.3 + 0.1/-0	(see P.12)
	45T	0.45 ± 0.05	
	85T	0.85 ± 0.05	
HR	30H	0.3 + 0.1/-0	(see P.12)
	45H	0.45 ± 0.05	
	85H	0.85 ± 0.05	
YR-a	20Y-a	0.2 ± 0.05	(see P.12)
	30Y-a	0.3 + 0.1/-0	
	45Y-a	0.45 ± 0.05	
	85Y-a	0.85 ± 0.05	
YR-c	20Y-c	0.2 ± 0.05	(see P.12)
	30Y-c	0.3 + 0.1/-0	
	45Y-c	0.45 ± 0.05	
GTR	15GTR	0.15 + 0.02/-0.04	(see P.12)
	20GTR	0.2 + 0.02/-0.04	
	30GTR	0.3 + 0.1/-0	
GHR	15GHR	0.15 + 0.02/-0.04	(see P.12)
	20GHR	0.2 + 0.02/-0.04	
	30GHR	0.3 + 0.1/-0	
GSR	20GSR	0.2 ± 0.05	310 x 310 (see P.12)
	30GSR	0.3 + 0.1/-0	
	45GSR	0.45 ± 0.05	
	85GSR	0.85 ± 0.05	
GAR	20GAR	0.2 ± 0.05	(see P.12)
	30GAR	0.3 + 0.1/-0	
	45GAR	0.45 ± 0.05	

Tube

TR HR YR-a YR-c

(mm)

Part Number	Usable Transistors	Thickness	Inner Diameter	Length	Ordering unit
30(series)-11-25L 30(series)-11-30L	TO-220 type	0.30 $^{+0.1}_{-0}$	φ11±1	25±1, 30±1	500 integral multiples
45(series)-11-25L 45(series)-11-30L		0.45±0.05	φ11±1	25±1, 30±1	
85(series)-11-25L 85(series)-11-30L		0.85±0.05	φ11±1	25±1, 30±1	
30(series)-13.5-25L 30(series)-13.5-30L	TO-3P type	0.30 $^{+0.1}_{-0}$	φ13.5±1	25±1, 30±1	500 integral multiples
45(series)-13.5-25L 45(series)-13.5-30L		0.45±0.05	φ13.5±1	25±1, 30±1	
85(series)-13.5-25L 85(series)-13.5-30L		0.85±0.05	φ13.5±1	25±1, 30±1	

Tape

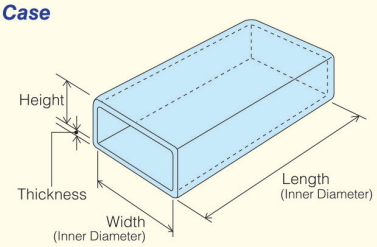
TR HR YR-a YR-c
GTR GHR GAR

(mm)

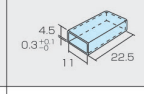
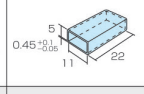
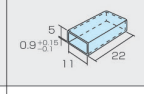
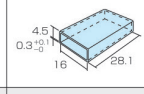
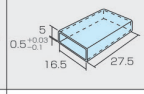
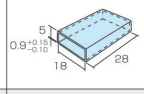
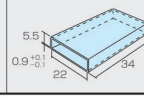
Part Number	Thickness	Width	Ordering unit
30(series)-36W	0.30 $^{+0.1}_{-0}$	36±1	100m integral multiples
30(series)-85W		85±3	
45(series)-36W	0.45±0.05	36±1	50m integral multiples
45(series)-85W		85±3	
85(series)-36W	0.85±0.05	36±1	
85(series)-85W		85±3	

Case

TR HR



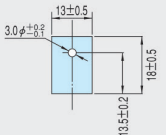
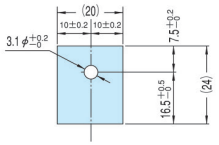
(mm)

Part Number	Usable Transistors	Thickness	Dimensions	Ordering unit
30(series)-TO-220-02225	TO-220 type	0.30 $^{+0.1}_{-0}$		500 integral multiples
45(series)-TO-220-01220		0.45 $^{+0.1}_{-0.05}$		
90(series)-TO-220-01220		0.90 $^{+0.15}_{-0.1}$		
30(series)-TO-3P-03281	TO-3P type	0.30 $^{+0.1}_{-0}$		500 integral multiples
50(series)-TO-3P-02275		0.50 $^{+0.05}_{-0.1}$		
90(series)-TO-3P-01280		0.90 $^{+0.15}_{-0.1}$		
90(series)-TO-3P-01340		0.90 $^{+0.1}_{-0.1}$		

Die-cut Gaskets

TR HR YR-a YR-c
GTR GHR GSR GAR

(mm)

Part Number	Thickness	Dimensions	Ordering unit
30(series)-TO-220	0.30 $^{+0.1}_{-0}$		500 integral multiples
45(series)-TO-220	0.45±0.05		
30(series)TO-3PF	0.30 $^{+0.1}_{-0}$		
45(series)-TO-3PF	0.45±0.05		

Note: Custom size and materials available

SARCON®
STANDARD TYPE

NEWTRONIC

SARCON®	Construction		Thickness (mm)	Sheet (mm)
GR-ae	50G-ae	50G-Hae	0.5 ± 0.05	300 x 200 (Recommended Usable Size; 290 x 190)
	50G-F2ae	50G-HF2ae	0.5 ± 0.15	
	100G-ae	100G-Hae	1.0 ± 0.10	
	100G-F2ae	100G-HF2ae	1.0 ± 0.20	
	150G-ae	150G-Hae	1.5 ± 0.15	
	150G-F2ae	150G-HF2ae	1.5 ± 0.20	
	200G-ae	200G-Hae	2.0 ± 0.20	
	200G-F2ae	200G-HF2ae	2.0 ± 0.30	
	250G-ae	250G-Hae	2.5 ± 0.25	
	300G-ae	300G-Hae	3.0 ± 0.30	
	350G-ae	350G-Hae	3.5 ± 0.35	
	400G-ae	400G-Hae	4.0 ± 0.40	
	450G-ae	450G-Hae	4.5 ± 0.45	
	500G-ae	500G-Hae	5.0 ± 0.50	
GR14A	GR14A-00-50GY	GR14A-0H-50GY	0.5 ± 0.15	300 x 200 (Recommended Usable Size; 290 x 190)
	GR14-00-100GY	GR14A-0H-100GY	1.0 ± 0.20	
	GR14A-00-150GY	GR14A-0H-150GY	1.5 ± 0.20	
	GR14A-00-200GY	GR14A-0H-200GY	2.0 ± 0.30	
	GR14A-00-250GY	GR14A-0H-250GY	2.5 ± 0.30	
	GR14A-00-300GY	GR14A-0H-300GY	3.0 ± 0.30	
	GR14A-00-350GY	GR14A-0H-350GY	3.5 ± 0.35	
	GR14A-00-400GY	GR14A-0H-400GY	4.0 ± 0.40	
	GR14A-00-450GY	GR14A-0H-450GY	4.5 ± 0.45	
	GR14A-00-500GY	GR14A-0H-500GY	5.0 ± 0.50	
GR25A	GR25A-0H2-30GY		0.3 ± 0.06	300 x 200 (Recommended Usable Size; 290 x 190)
	GR25A-G0-30GY			
	GR25A-00-50GY	GR25A-0H-50GY	0.5 ± 0.05	
	GR25A-F0-50GY	GR25A-FH-50GY	0.5 ± 0.15	
	GR25A-G0-50GY			
	GR25A-00-100GY	GR25A-0H-100GY	1.0 ± 0.10	
	GR25A-F0-100GY	GR25A-FH-100GY	1.0 ± 0.20	
	GR25A-G0-100GY			
	GR25A-00-150GY	GR25A-0H-150GY	1.5 ± 0.15	
	GR25A-F0-150GY	GR25A-FH-150GY	1.5 ± 0.20	
	GR25A-G0-150GY			
	GR25A-00-200GY	GR25A-0H-200GY	2.0 ± 0.20	
	GR25A-F0-200GY	GR25A-FH-200GY	2.0 ± 0.30	
	GR25A-00-250GY	GR25A-0H-250GY	2.5 ± 0.25	
	GR25A-00-300GY	GR25A-0H-300GY	3.0 ± 0.30	
	GR25A-00-350GY	GR25A-0H-350GY	3.5 ± 0.30	
	GR25A-00-400GY	GR25A-0H-400GY	4.0 ± 0.30	
	GR25A-00-450GY	GR25A-0H-450GY	4.5 ± 0.30	
	GR25A-00-500GY	GR25A-0H-500GY	5.0 ± 0.30	
GR45A	GR45A-00-50GY	GR45A-0H-50GY	0.5 ± 0.15	300 x 200 (Recommended Usable Size; 280 x 190)
	GR45A-00-100GY	GR45A-0H-100GY	1.0 ± 0.20	
	GR45A-00-150GY	GR45A-0H-150GY	1.5 ± 0.20	
	GR45A-00-200GY	GR45A-0H-200GY	2.0 ± 0.30	
	GR45A-00-250GY	GR45A-0H-250GY	2.5 ± 0.30	
	GR45A-00-300GY	GR45A-0H-300GY	3.0 ± 0.30	
	GR45A-00-350GY	GR45A-0H-350GY	3.5 ± 0.35	
	GR45A-00-400GY	GR45A-0H-400GY	4.0 ± 0.40	
	GR45A-00-450GY	GR45A-0H-450GY	4.5 ± 0.45	
	GR45A-00-500GY	GR45A-0H-500GY	5.0 ± 0.50	
	GR45A-00-50GY	GR45A-0H-50GY	0.5 ± 0.15	
	GR45A-00-100GY	GR45A-0H-100GY	1.0 ± 0.20	
	GR45A-00-150GY	GR45A-0H-150GY	1.5 ± 0.20	
	GR45A-00-200GY	GR45A-0H-200GY	2.0 ± 0.30	

Note; *Some products are not in-stock items. Please contact us for an inventory status.
*If you do not see what you want, Please ask for it.
*If you do not see what you want, Please contact us for confirming.

SARCON®	Construction		Thickness (mm)	Sheet (mm)
GR45A	GR45A-00-250GY	GR45A-0H-250GY	2.5 ± 0.30	300 x 200 (Recommended Usable Size; 280 x 190)
	GR45A-00-300GY	GR45A-0H-300GY	3.0 ± 0.30	
	GR45A-00-350GY	GR45A-0H-350GY	3.5 ± 0.35	
	GR45A-00-400GY	GR45A-0H-400GY	4.0 ± 0.40	
	GR45A-00-450GY	GR45A-0H-450GY	4.5 ± 0.45	
	GR45A-00-500GY	GR45A-0H-500GY	5.0 ± 0.50	
GR80A		GR80A-0H-30GY	0.3 ± 0.06	300 x 200 (Recommended Usable Size; 280 x 180)
		GR80A-0H-50GY	0.5 ± 0.10	
	GR80A-00-100GY	GR80A-0H-100GY	1.0 ± 0.15	300 x 200 (Recommended Usable Size; 290 x 190)
	GR80A-00-150GY	GR80A-0H-150GY	1.5 ± 0.20	
	GR80A-00-200GY	GR80A-0H-200GY	2.0 ± 0.30	
	GR80A-00-250GY	GR80A-0H-250GY	2.5 ± 0.30	
	GR80A-00-300GY	GR80A-0H-300GY	3.0 ± 0.30	
XR-m	30X-m		0.3 ± 0.06	150 x 190 (140 x 190)
	50X-m		0.5 ± 0.10	
	100X-m		1.0 ± 0.20	300 x 200 (Recommended Usable Size; 290 x 190)
	150X-m		1.5 ± 0.20	
	200X-m		2.0 ± 0.30	
GR130A	GR130A-00-30GY		0.3 ± 0.06	300×200 (Recommended Usable Size; 290 x 190)
	GR130A-00-50GY		0.5 ± 0.10	
	GR130A-00-100GY		1.0 ± 0.20	
	GR130A-00-150GY		1.5 ± 0.20	
	GR130A-00-200GY		2.0 ± 0.30	
PG25A	PG25A-00-100GY		1.0 ± 0.15	300 x 200 (Recommended Usable Size; 280 x 190)
	PG25A-00-150GY		1.5 ± 0.20	
	PG25A-00-200GY		2.0 ± 0.30	
	PG25A-00-250GY		2.5 ± 0.30	
	PG25A-00-300GY		3.0 ± 0.30	
	PG25A-00-350GY		3.5 ± 0.35	
	PG25A-00-400GY		4.0 ± 0.40	
	PG25A-00-450GY		4.5 ± 0.45	
	PG25A-00-500GY		5.0 ± 0.50	
PG45A	PG45A-00-150GY		1.5 ± 0.25	300×200 (Recommended Usable Size; 290 x 190)
	PG45A-00-200GY		2.0 ± 0.30	
	PG45A-00-250GY		2.5 ± 0.35	
GR-Pm	150G-Pm		1.5 + 0.5/-0	300 x 200 (290 x 190)
	200G-Pm		2.0 + 0.7/-0	
	250G-Pm		2.5 + 0.7/-0	
PG80A	PG80A-00-50BL		0.5 ± 0.10	300 x 200 (Recommended Usable Size; 290 x 190)
	PG80A-00-100BL		1.0 ± 0.15	
	PG80A-00-150BL		1.5 ± 0.25	
	PG80A-00-200BL		2.0 ± 0.35	
XR-Um	20X-Um	20X-Um-AL	0.22± 0.04	(see P.22)
	30X-Um	30X-Um-AL	0.3 ± 0.06	
	40X-Um	40X-Um-AL	0.4 ± 0.08	
	50X-Um	50X-Um-AL	0.5 ± 0.10	
NR-c	50N-Tc	50N-HTc	0.5 ± 0.15	300 x 200 (Recommended Usable Size; 290 x 190)
	100N-c	100N-Hc	1.0 ± 0.10	
	100N-Tc	100N-HTc	1.0 ± 0.20	
	150N-c	150N-Hc	1.5 ± 0.15	
	150N-Tc	150N-HTc	1.5 ± 0.20	
	200N-c	200N-Hc	2.0 ± 0.20	
	200N-Tc	200N-HTc	2.0 ± 0.30	
	250N-c	250N-Hc	2.5 ± 0.25	
	300N-c	300N-Hc	3.0 ± 0.30	
EGR-11F	50EG-11F		0.5 ± 0.15	300 x 200 (Recommended Usable Size; 290 x 190)
	100EG-11F		1.0 ± 0.20	
	150EG-11F		1.5 ± 0.20	

SARCON®
TEST METHOD

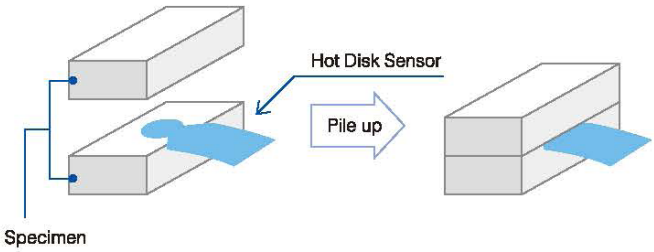
TEST METHOD OF THERMAL CONDUCTIVITY BY ISO 22007-2

STANDARD

TEST METHOD: FTM P-1612 (HOT DISK METHOD)

1. METHOD

The probe of which the thermal conductivity is known is pu
on the specimen. Then the hot wire is given constant electr
power.



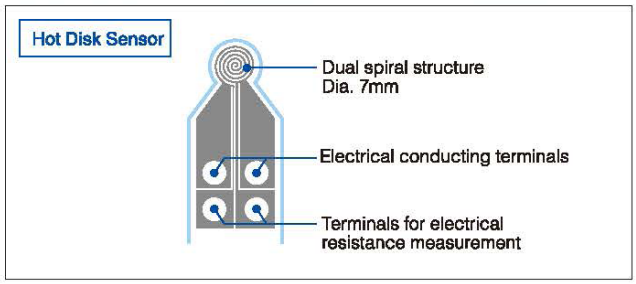
2. PRINCIPLE

A thermal conductivity is given by the equation below.

$$\lambda = \frac{P_0 \cdot D(\tau)}{\pi^{3/2} \cdot r} \cdot \frac{D(\tau)}{\Delta T(\tau)}$$

λ : Thermal Conductivity (W/m-K)
P_0 : Electric Power (W)
r : A Radius of Sensor (m)
τ : $\sqrt{\alpha \cdot t / r^2}$
α : Thermal Diffusivity (m^2/s)
t : Measurement Time (s)
$D(\tau)$: Function of τ
$\Delta T(\tau)$: Temperature Increase of Sensor (K)

Thermal conductivity is calculated by software for calculation.



Specimen : Thickness -- 3.0mm sheet, 3 sheets stacked
Width x Length -- 50 x 50 mm

3. APPARATUS

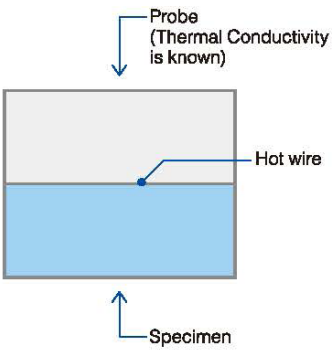
Thermal Conductivity meter	TPS-2500
Sensor	RTK Polyimide

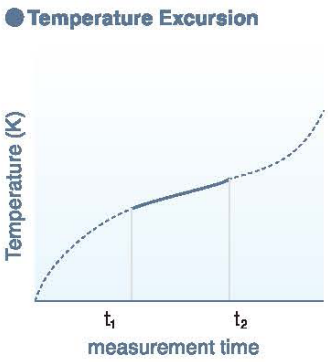
TEST METHOD OF THERMAL CONDUCTIVITY BY ASTM D2326 EQUIVALENT

TEST METHOD: FTM P-1620 (HOT WIRE METHOD)

1. METHOD

The probe of which the thermal conductivity is known is put on the specimen. Then the hot wire is given constant electric power.
Thermal conductivity is calculated by software for calculation.
Specimen : Thickness -- 0.1 to 2.0 mm
Width x Length -- Min. 120 x 60 mm





2. PRINCIPLE

A thermal conductivity is given by the equation below.

$$\lambda = \frac{Q \cdot \ell n(t_2 / t_1)}{4\pi \cdot (T_2 - T_1)}$$

λ : Thermal Conductivity(W/m-K)
Q : Quantity of Transferred heat (W/m)
T_1, T_2 : Temperature at times t_1 and t_2 (K)
t_1, t_2 : Measurement Time (s)

3. APPARATUS

Thermal Conductivity meter	QTM-D3
Calculator	PC9801BX2
Probe	QTM-PD1

STANDARD

METHOD OF THERMAL RESISTANCE BY ASTM D5470 EQUIVALENT

TEST METHOD: FTM P-3050 (TIM TESTER METHOD)

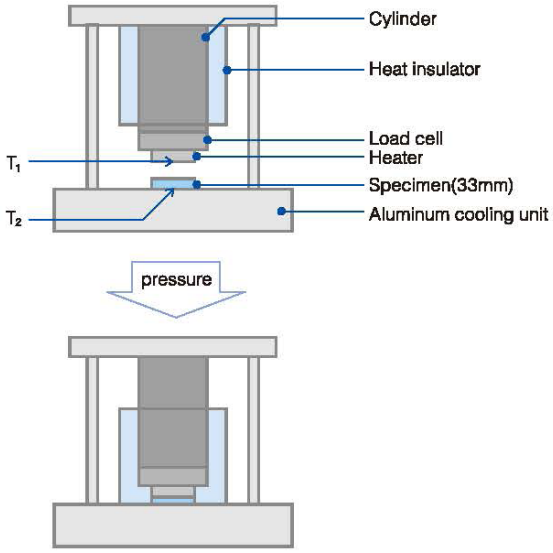
1. PRINCIPLE

Thermal Resistance

$$Rt = \frac{T_1 - T_2}{Q} \cdot S$$

- Rt : Thermal Resistance (K-cm²/W)
- T_1 : Heater temperature (K)
- T_2 : AL cooling plate temperature (K)
- Q : Heat flow (W)
- S : Area of the compressed specimen (cm²)

● The measurement by the load



2. MEASURING EQUIPMENT

Analysis Tech TIM Tester 1300

The Analysis Tech TIM Tester 1300 automatically includes the overall estimated accuracy with the thermal impedance data. This measuring equipment conforms to the test method ASTM D5470, Thermal Transmission Properties of Thermally Conductive Electrical Insulation Materials with the most recent revision .

TEST METHOD OF THERMAL RESISTANCE AND THERMAL CONDUCTIVITY BY ASTM D5470 MODIFIED

TEST METHOD: FTM P-3030 (GUARDED HOT PLATE METHOD FOR REFERENCE)

1. PRINCIPLE

Thermal Resistance

$$Rt = ((T_1 - T_2) \cdot S/Q) - 0.34$$

- Rt : Thermal Resistance (K-cm²/W)
- T_1 : AL heating plate temperature (K)
- T_2 : AL cooling plate temperature (K)
- Q : Heat flow (W)
- S : Area of the compressed specimen (cm²)
- 0.34 : Tthermal resistance revision value of AL plate

Thermal Conductivity

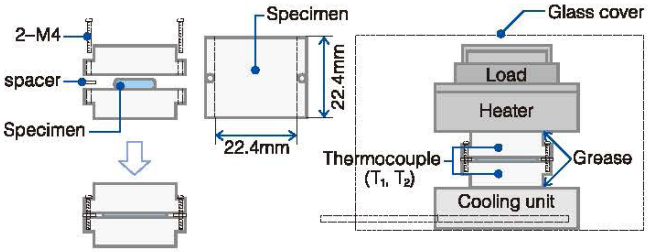
$$\lambda = \frac{T_3 - T_4}{R_{T3} - R_{T4}}$$

- λ : Thermal Conductivity (W/m-K)
- T_3 : Thickness of Specimen 1 (cm)
- T_4 : Thickness of Specimen 2 (cm)

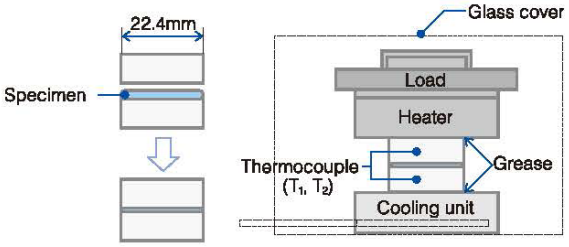
($T_3 > T_4$)

- R_{T3} : Thermal Resistance of Specimen 1 (K-cm²/W)
- R_{T4} : Thermal Resistance of Specimen 2 (K-cm²/W)

THE MEASUREMENT BY THE QUANTITY OF COMPRESSION



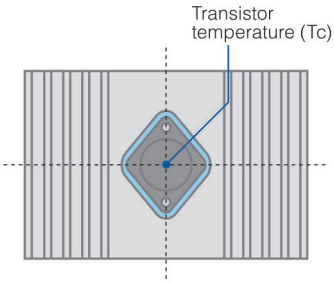
THE MEASUREMENT BY THE LOAD



SARCON®
TEST METHOD
TEST METHOD FOR THERMAL RESISTANCE

TEST METHOD: FTM P-3010(TO-3 METHOD)

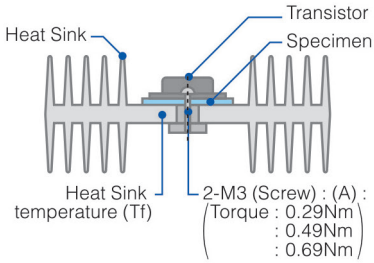
1. TEST METHOD



1) Punched-out specimen in TO-3 package is located between a transistor and heat sink, and secured with screws the position (A),using a screwdrive
2) 20 Watt power is applied to the transistor.
3) After three minutes, the thermal resistance is calculated based on the foliowing formula (B).

2. PRINCIPLE

Formula for Thermal Resistance calculation.



(B) : $Rt = (Tc - Tf) / P_0$

Rt : Thermal resistance (K-in² / W)
Tc : Transistor temperature (K)
Tf : Heat sink temperature (K)
P_0 : Heat flow (W)

3. APPARATUS

Transistor	2SC2245(TO-3 package)
Heat Sink	40CH104L-90-K (manufactured by Ryosan Co., Ltd)
Heat Sensor	2SC1-OHK300 x 532W x J002Y (manufactured by Chino Co., Ltd)
Condition	25°C 60%RH

TIM TESTER METHOD AND HOT DISK METHOD AS STANDARD.

CURRENT STANDARD TEST METHOD;

- Hot Disk method for Thermal Conductivity testing
- TIM-Tester method for Thermal Resistance testing

BACKGROUND

• Hot Wire method was ineffieient to test over 4 W/m-K material for Thermal Conduetivity due to unstable Contaet Thermal Resistance, and it was worse than TO-3 method in 2000.
• Guarded Heater method was more efficient than TO-3 method, so it was defined as Fujipoly standard method in 2002.
• After that, Hot Disk method and TIM-Tester method were both defined as latest Fujipoly standard method due to so reliable in 2012.

1) HOT DISK METHOD FOR THERMAL CONDUCTIVITY (TC) MEASURING

[Advantage] The measured TC does not depend on the specimen's surface-roughness and hardness due to wide measuring range. And it is more stable than Hot Wire method.
[Disadvantage] Specimen's dimensions, 50 sq-mm x 7mm thickness is so big that the measured TC is a little different from the true ane.

2) TIM TESTER METHOD FOR THERMAL RESISTANCE (TR) MEASURING

[Advantage] The measured TR can be close to the true TR due each specimen's thickness.
[Disadvantage] The measured TR depends on the specimen's surface-roughness or hardness, and it is not stable.

3) HOT WIRE METHOD FOR TC MEASURING.
[Problem] The measured TC is unstable depending on the specimen's surface-roughness due to fixed-point type thermocouple.

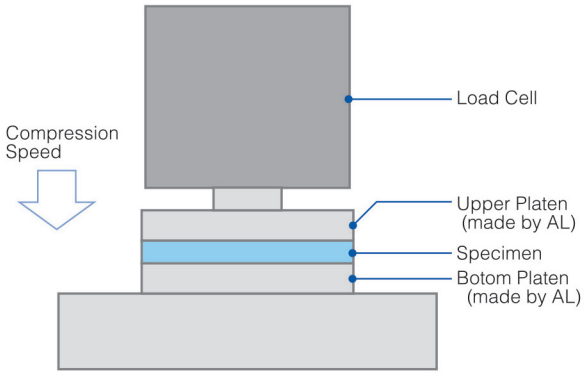
4) GUARDED HEALER METHOD MODIFIED ASTM D 5470 FOR TR MEASURING.
[Problem] The measured TR is lower than the true ane because it is impossible to prevent heat dissipation from the Aluminum blocks which hold the specimen. It is also unstable under continuous compression depending on specimen's deformation which comes from small difference in hardness and modulus.

(TEST METHOD OF COMPRESSION FORCE BY ASTM D575-91(2012)

1. TEST METHOD
Compression test in which the force required to cause a specified deflection is determined.

2. TEST CONDITION

Specimen	Dia.28.6mm (1.13in) Thickness is according to each materials
	Number of specimens; 3pcs
Platens	Dia.28.6mm (1.13in)
Compression Speed	5.0mm/min (0.2in/min) *Fujipoly original speed



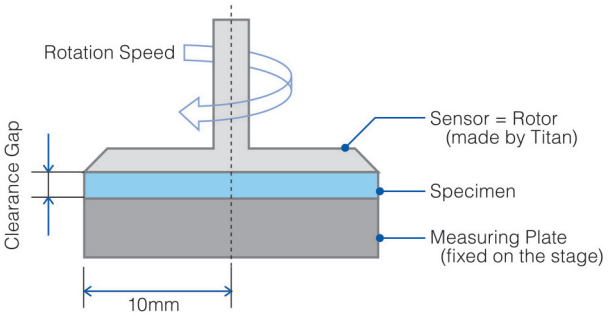
[Note]
Measuring Form in Place Gap Filler type:
The specimen is pressed till setting a gap, and then waiting for the load to settle down. Setting a gap: 0.5mm or 1.0mm.

TEST METHOD OF VISCOSITY BY ASTM D1824 - 95(2010) MODIFIED

1. TEST METHOD
Covers the measurement of SARCON's viscosity at low shear rates.

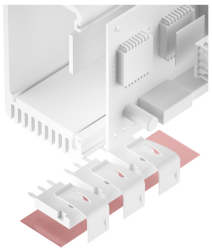
2. APPARATUS

Equipment	HAAKE RotoVisco 1
Sensor	C20/2
Clearance Gap	0.5mm
Rotational Speed	0.5(1/s), 1.0(1/s)

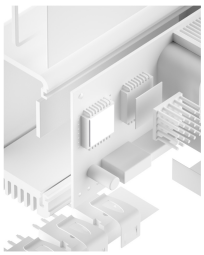


KØLEPROFILER

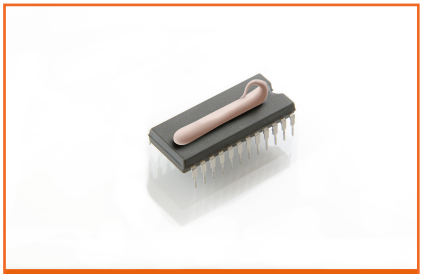
VORES PRODUKTSORTIMENT INKLUDERER:



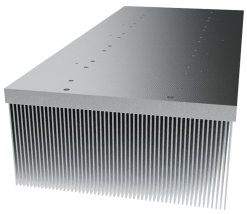
FOILS & FILMS



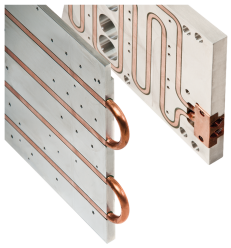
PSA INSULATING TAPE



SARCON GENERELT



PROFILMECC



VÆSKE KØLEDE PROFILER

KØLEPROFILER

VI FØRER PRODUKTER INDENFOR KATEGORIERNE:

AUTOMATIK

HVAC & BYGNINGS-AUTOMATIK

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