Tigers Polymer Rubber Sheet

TIGERS POLYMER CORPORATION

::::: Please make sure to read before use :::::

Instruction for Use

- The data in this catalogue are tested values and not standard values. Furthermore, the contents mentioned are subject to change without notice for reasons of improvements.
- It is recommended to always refer to the catalogues or to test results so that the products in this catalogue can retain their original functions and be used safely.
- The products in this catalogue are manufactured for general industrial use and not for special applications (such as for medical appliances and for good machinery).
- The user is requested to confirm the adequacy and safety for the intended application in the case of cutting and using the products in this catalogue as parts.

Storage

Warning	Fire is strictly prohibited. Furthermore, these products should be stored by avoiding the vicinity of heat sources such as stoves and nearby equipments that produce electric sparks.
Caution	These products should be stored indoors where they are not exposed to direct sunlight, wind, and rain.
Caution	These products should not be bent nor be locally deformed.
Caution	These products should not be dragged nor pulled over the ground.

Processing

Warning	There is the possibility of causing injury to workers by the smoke at time of grinding and chips at time of cutting in the case of processing these products. Workers should wear safety goggles and masks.
Warning	There is the risk of spontaneous ignition when polished powders and chips of the products are accumulated and it becomes a cause of burns and fires. Therefore, it is recommended to remove when powders and chips accumulate.

Use

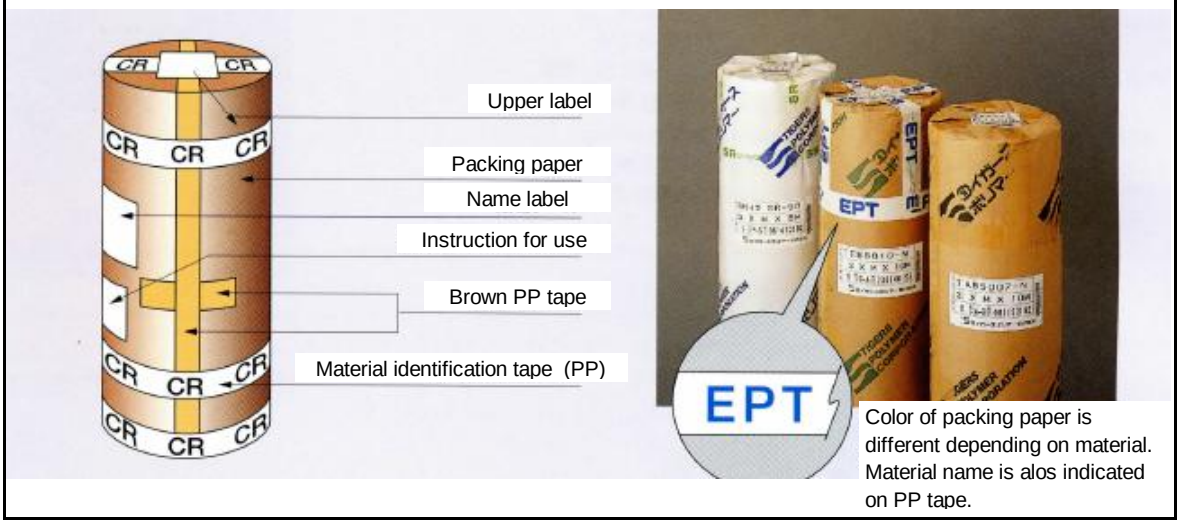
Caution	These products are not suited for medical appliance and for food machinery.
Caution	These products are not suited for applications that come in direct contact with the human body for a long time.
Caution	The life and safety of these products are greatly affected by the application, condition of use, method of fitting and environment. Users are recommended to thoroughly confirm in the case of use as parts.
Caution	There are cases of discoloration and changing of the quality caused by the precipitation and migration of the contents in case of use by close adherence of the product to the mating part.
Caution	General performances are mentioned regarding the chemical resistance. Users should confirm in regard to individual uses.

Disposal

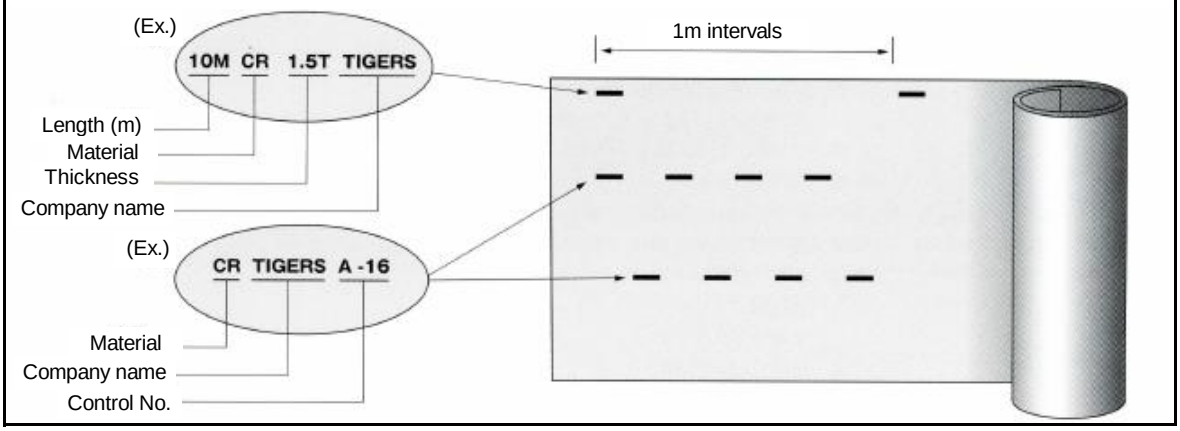
Warning	There are cases of noxious gases being produced when scrap material at time of use or member pieces after use are burned. It is recommended to strictly observe legal disposal methods of industrial waste at time of disposal.

Contents

■External Specification of Rubber Sheet Packing



Length (m), material, thickness, and company name are printed on one side of rubber sheet surface at 1 meter intervals. (The distance (1m) between the indications should be regarded as rough length. Rubber sheets should be cut after measurement of actual length.) **Material, company name, and control No.** are printed on around middle part.

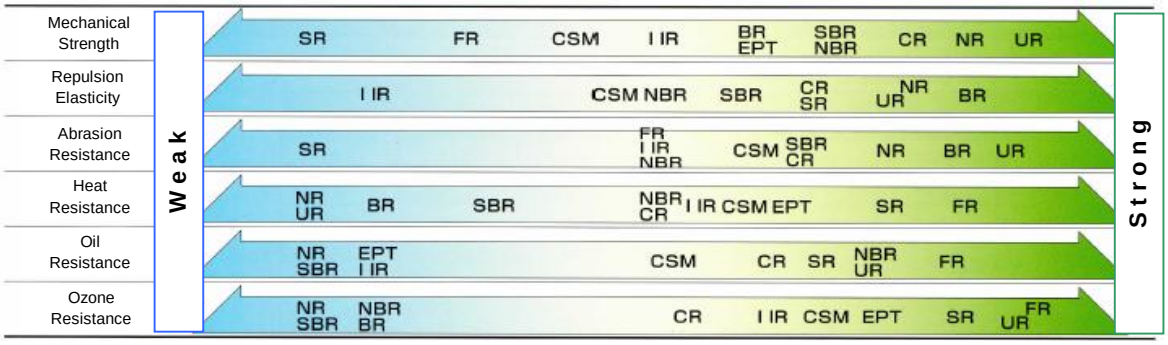


■External Specification List of Rubber Sheet Packing

Material	PP Tape Color / Printed Color of Character for Material Identification	Packing Paper Color / Printed Color of Character
N R (Natural Rubber)	Brown base / No character printed	Brown base / Black character
C R (Chloroprene Rubber)	White base / Black character	Brown base / Green character
NBR (Acrylonitrilebutadiene Rubber)	White base / Yellow character	Brown base / Green character
EPT (Ethylene-Propylene Rubber)	White base / Blue character	Brown base / Green character
I I R (Isobutylene Isoprene Rubber)	White base / Green character	Brown base / Green character
CSM (Chlorosulfonated Polyethylene Rubber)	White base / Red character	Brown base / Green character
SBR (Styrene-Butadiene Rubber)	Brown base / No character printed	Brown base / Green character
B R (Butadiene Rubber)	Brown base / No character printed	Brown base / Green character
S R (Silicone Rubber)	Transparent base / Pale green character	White base / Dark blue character
F R (Fluoro Rubber)	Transparent base / Pale pink character	White base / Dark blue character
U R (Urethane Rubber)	Craft tape / No character printed	Brown base / Green character

※ SR, FR, and UR may be delivered as usual by brown cardboard box depending on thickness of rubber sheet.

■Order of Merit in Properties for Various Rubbers



※ Confirm in advance when using. These are indicated just as general properties.

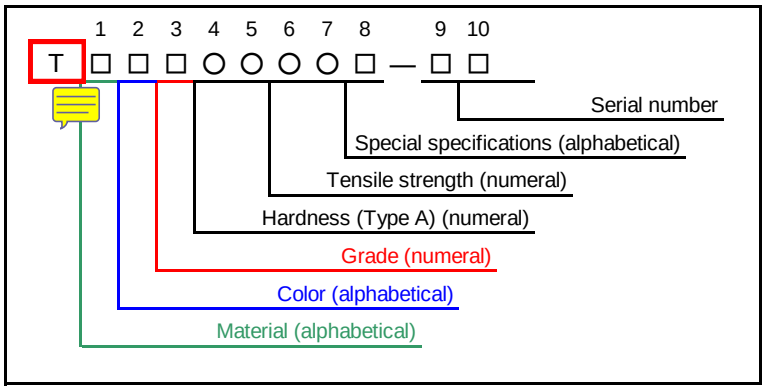
■Commodity Number of Rubber Sheet

Scope of Application

This system of marking is standardized regarding the commodity name of general rubber sheets excluding the case that customers specify.

Contents

Commodity name is composed of following alphabet and number.



Explanation of Codes

1 shows rubber material	
A :	Natural rubber
N :	NBR
C :	CR
E :	EPT
H :	CSM
I :	IIR
S :	SBR
B :	BR
R :	Acrylic rubber
D :	Epichlorohydrin rubber

2 shows rubber color	
K :	Black
W :	White
R :	Red
B :	Blue
H :	Gray
Y :	Yellow
M :	Green
A :	Amber

3 shows grade	
L :	Low grade
M :	Medium grade
H :	High grade

4 & 5 ….. show hardness

6 & 7 ….. show tensile strength

Indicate as 07 in case that standard value is more than 7 MPa {71kgf/cm^2}

Indicate as 10 in case that standard value is more than 10 MPa {102kgf/cm^2}

8 …… An alphabetical character is entered when there is a special specification.

Not entered when there is not any special specification

i) Constructional Special Specifica	
C	Multilayer
N	Cloth Inserted
T	Teflon laminated
H	Cloth laminated

ii) Functional (property) Special Specifications	
A	Heat aging resistance test
B	Compression set resistance test
D	Compression strength test
E	Oil resistance test
F	Low temperature test
G	Tear test
H	Flexing test
J	Abrasion test

ii) Functional (property) Special Specifications	
K	Adhesion test
L	Water absorption test
M	Flame resistance test
O	Ozone resistance test
P	Contamination test
R	Electrical resistance test
S	Resilience test
Z	Other special requirements

9 & 10 … show serial number

■Thickness Tolerance and Thickness Deviation of Rubber Sheet (Applicable to standard products)

Thickness	Natural Rubber		Synthetic Rubber		Silicone Rubber, Fluoro Rubber	
	Tolerance	Deviation	Tolerance	Deviation	Tolerance	Deviation
Less than 1.50	±0.15	0.20	±0.15	0.20	±0.15	0.20
Less than 2.00	±0.25	0.30	±0.20	0.25	±0.15	0.25
Less than 3.00	±0.30	0.40	±0.25	0.35	±0.25	0.35
Less than 4.00	±0.30	0.40	±0.30	0.40	±0.25	0.35
Less than 6.00	±0.40	0.50	±0.40	0.50	±0.35	0.45
Less than 9.00	±0.50	0.70	±0.50	0.70	±0.45	0.45
Less than 10.00	±0.60	0.80	±0.60	0.80	±0.45	0.60
Less than 19.00	+ 0.90 − 0.50	1.00	+ 0.90 − 0.50	1.00	±0.60	0.80
Less than 20.00	+ 1.00 − 0.50	—	+ 1.00 − 0.50	—	+ 1.00 − 0.50	—
Less than 25.00	+ 1.50 − 0.50	—	+ 1.50 − 0.50	—	+ 1.50 − 0.50	—
Less than 30.00	+ 2.00 − 0.50	—	+ 2.00 − 0.50	—	+ 2.00 − 0.50	—
Less than 50.00	+ 2.50 − 0.50	—	+ 2.50 − 0.50	—	+ 2.50 − 0.50	—
Less than 70.00	+ 2.50 − 0.50	—	+ 2.50 − 0.50	—	+ 2.50 − 0.50	—
Less than 130.00	+ 3.50 − 0.50	—	+ 3.50 − 0.50	—	—	—

Unit: mm

■Manufacturable Dimension of Rubber Sheet

(Separately indicated about urethane rubber sheet & sponge sheet)

Type	Thickness (mm)	Width (m) ※(1)	Length (m) ※(2)
General R/S Synthetic R/S	0.5 - 0.8	1	20
	1 - 3	1	20
	4 - 10	1	10
	11 - 30	1	5
	31 - 130	1	2
Silicone R/S Fluoro R/S	0.5 - 50	1 ※(3)	2 ※(4)
	60 - 120	1	1 ※(5)

R/S=Rubber Sheet
The above mentioned size shall be our standard.
Please consult us about the other size.

※(1) Width of general/synthetic R/S

Can be manufactured up to 1.3m for thickness of 6mm or less
Can be manufactured up to 1.2m for thickness of 8mm to 30mm.

※(2) Length of general/synthetic R/S

Can be manufactured up to 3m for thickness of 31mm to 50mm.
Can be manufactured up to 2m for thickness of 51mm to 130mm.

※(3) Width of silicone R/S; Can be manufactured up to 1.2m for thickness of 6mm or less.

※(4) Length of silicone R/S; Can be manufactured up to 2m to 10m for thickness of 6mm or less.

※(5) Length of fluoro R/S; Can be manufactured up to 10m for thickness of 5mm or less.

Can be manufactured up to 3m for thickness of 6mm or more.

■Explanation of Terms

Hardness

Numerical value which indicates resistance by rubber against needle or ball which presses the rubber surface.
Measured value is a standard nominal hardness that is measured in 1 second. Value with "( )" use is measured in 3 seconds according to JIS K 6253 : 2006 (Physical testing method of vulcanized rubber)

Tensile Strength at Break

Maximum tensile stress which is measured when a test specimen finally breaks after being stretched, and is normally expressed by a value which the maximum load is divided by the original cross-section area of the test specimen.

Elongation at Break

Deformation in stretched direction which is caused when a test specimen is stretched, and is expressed by the percentage of increase in length against the original length.

Compression Set

Permanent deformation in compressed direction which is caused when a test specimen is compressed to a certain percentage in thickness for a specified time under specified temperature and left for another specified time after removing the compression load, and is expressed by the percentage of the decreased length from the original thickness against the compressed length in thickness.

Tension Set

Permanent elongation which is caused when a rubber product is stretched and left for a certain time after the load of stretch is removed.

Tear Resistance

Tearing resistance which is expressed by the value which maximum load, which a test specimen is torn after being stretched, is divided by thickness of the test specimen.

Oil Resistance Alteration in volume or resistance of rubber against deterioration in physical properties by contact with oil.

Flame Resistance Properties which is hard to burn if touched flame and hard to keep burning with flame if ignition is caused.

Environment-Responsive Rubber Sheet

Recently, worldwide efforts to reduce environmental load have been undertaken more actively.
In Japan, environmentally hazardous substances have been designated by Law for PRTR, Law Concerning the Examination and Regulation of Manufacture, etc of Chemical Substances and JGPSSI (Japan Green Procurement Survey Standardization Initiative), and each company has established green procurement standard based on these laws and etc.
Our company analyzed not only standard compounds but also all custom-made compounds about inclusion or non-inclusion of the 6 chemical substances which are banned to use by RoHS enhancing our analyze system, and have met each customer's requirement by each required method of analysis.
Followings are the nonuse compounds of the aforesaid 6 chemical substances (Documents as evidence can be issued.) and the substances designated by Law for PRTR.

Features

- The related chemical substances designated by Law for PRTR are not used at all.
- Conform to standard of the object substances defined by RoHS directive and ELV directive.
  Meet the standard by "Cd : 5ppm or less" and "The other substances : 100ppm or less".
- PVC and phthalate compounds are not contained.
- Documents as evidence of inclusion or non-inclusion can be issued.

※ For PBBs and PBDEs, certificate of nonuse is to be issued.

(Notes)

Law for PRTR	Laws concerning comprehension and promotion of improvement in control of release amounts of specific chemical substances in the environment.
RoHS Directive	Restriction of the use of certain hazardous substances in electrical and electronic equipment.
ELV Directive	End of life vehicles order
SOC4 (Substance of Concern)	Lead, mercury, cadmium, hexavalent chrome

<Reference>

■ Environmentally hazardous substances designated by RoHS

	Cd	Pb	Hg	Cr6+	PBBs	PBDEs	RoHS
	5ppm or less	100ppm or less	100ppm or less	100ppm or less	100ppm or less	100ppm or less	Conformable or not
Environment-Responsive Rubber Sheet	○	○	○	○	○	○	○

○ = Conformed (less than standard value)

■ Analyzed Product List (Excerpt as examples)

Item Name	Analysis Data <Refer to note on the margin of a page>							
	No. of data analyzed by our X-ray fluorescence spectrometer	Hg	Cr	Pb	Br	No. of test report issued by external test institutes	Cd	No. of test report base on Sony Technical Standard issued by external test institutes
TAKL6503-HP	A05079-E	○	○	○	○	(F) FOA 01453 14	○	
White NR sheet <HS65>	A06195-4	○	○	○	○	(F) GOA 05495 04	○	
TCKL6507	A05262-8	○	○	○	○	—	—	(F) FOA 09589 08 Cd: 0, Pb: 0
TEKM6510	A05262-1	○	○	○	○	—	—	(F) FOA 09589 01 Cd: 0, Pb: 0
TEKL7007	A05262-2	○	○	○	○	—	—	(F) FOA 09589 02 Cd: 0, Pb: 0
TFB8010	A06195-3	○	○	○	○	(F) GOA 05495 03	○	
SR-50	A05239-6	○	○	○	○	—	—	(F) FOA 13215 02 Cd: 0, Pb: 0
SR-70	A05079-A	○	○	○	○	(F) FOA 01453 10	○	(F) FOA 01453 10 Cd: 0, Pb: 0

(Note) [Below column of each element / Analysis Data] ○= Not detected

[External Test Institute] [(F)] = Japan Inspection Association of Food and Food Industry Environment

<Detection limit> Cd: 2ppm, Pb: 5ppm Cr: 2ppm

RS = Rubber Sheet

NR Sheet (Natural Rubber Sheet)

Features

- Excels in mechanical property
- Excels in elasticity
- Excels in abrasion resistance

Applications

- General packing, gasket material
- Rubber mat

■ Black Rubber Sheet Properties

Properties / Item Name		General Properties			Heat-Resistant Aging 70℃×72h			Compression Set 70℃×24h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %				
Black Normal Sheet	<65>	64 (64)	3.4 {35}	290	+ 8	+ 7	- 15	35	0.84	AAH0133	TAKL6503
	<75>	77 (75)	5.6 {57}	250	+ 7	- 4	- 20	33		AAH0133	TAKL7503
	<80>	83 (82)	9.5 {97}	230	+ 4	- 5	- 22	16		AAH8230	TAKL8005
Black Rubber Sheet (30%)	<50>	48 (48)	8.9 {91}	600	+ 4	+ 2	- 7	19		AAH5153	TAKL5005
	<60>	60 (60)	8.2 {84}	410	+ 7	+ 19	- 12	23		AAH6363	TAKL6007
	<70>	72 (71)	8.6 {88}	350	+ 8	- 10	- 24	28		AAH7343	TAKL7007
	<80>	80 (75)	9.7 {99}	270	+ 5	- 2	- 13	20		AAH8323	TAKL8007
	<90>	92 (89)	10.4 {106}	300	+ 2	+ 6	- 30	28		AAH9323	TAKL9005
Black Rubber Sheet (40%)	<40>	43 (43)	8.2 {83.6}	610	+ 6	+ 18	+ 2	18		AAH4373	TAKM4007
	<50>	48 (48)	8.9 {90.8}	600	+ 4	+ 2	- 7	19	0.82	AAH5373	TAKM5007
	<60>	61 (60)	10.2 {104}	420	+ 5	+ 6	- 12	13		AAH6463	TAKM6010
	<70>	73 (72)	17.5 {179}	430	+ 4	- 2	- 25	15		AAH7453	TAKM7010
	<90>	87 (82)	16.4 {167}	330	+ 3	+ 1	- 12	24		AAH9423	TAKM9010
Black Rubber Sheet (50%)	<40>	39 (35)	10.8 {110}	780	+ 3	+ 4	- 10	26		AAH4473	TAKM4010
	<50>	50 (50)	19.1 {195}	550	+ 5	- 10	- 17	14		AAH5473	TAKM5010
	<60>	56 (56)	22.2 {226}	470	+ 2	+ 9	- 20	13		AAH6573	TAKM6012

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■ Colored Rubber Sheet Properties

Properties / Item Name		General Properties			Heat-Resistant Aging 70℃×72h			Compression Set 70℃×24h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %				
White Normal sheet	<50>	53 (51)	6.5 {66}	550	+ 6	+ 12	- 2	35		AAH5153	TAWL5005
	<65>	63 (62)	5.4 {55}	480	+ 2	0	- 5	34	1.03	AAH0143	TAWL6504
	<85>	85 (81)	5.0 {51}	430	+ 5	- 20	- 22	50		AAH0142	TAWL8504
White Rubber Sheet	<40>	39 (39)	19.9 {203}	740	+ 4	- 6	- 10	16		AAH4573	TAWM4015
	<70>	69 (68)	10.0 {102}	680	- 1	- 4	- 3	46		AAH7363	TAWL7007
Red Normal Sheet	<65>	63 (62)	8.1 {83}	640	+ 5	+ 2	- 10	30		AAH0253	TARL6504
Green Normal Sheet	<70>	68 (68)	8.7 {89}	570	+ 4	- 5	- 5	29	1.29	AAH7233	TAML7005
Light-green Normal Sheet	<70>	66 (65)	7.6 {78}	590	+ 5	+ 1	- 7	43		AAH7233	TAML7004
Blue Normal Sheet	<65>	66 (65)	8.3 {85}	420	+ 7	- 5	- 15	35		AAH0233	TABL6504
Gray Normal Sheet	<65>	68 (68)	6.8 {69}	530	+ 1	- 1	- 8	43		AAH0133	TAHL6504

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■ Amber Rubber Sheet Properties

Properties / Item Name		General Properties			Heat-Resistant Aging 70℃×72h			Compression Set 70℃×24h %	JIS K 6380 Corresponding No.	Item Number
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %			
Amber Rubber Sheet (40%)	<50>	48 (47)	11.8 {120}	640	+ 3	+ 5	- 7	14	AAH5373	TAAL5007
Amber Rubber Sheet (60%)	<45>	47 (47)	19.1 {195}	680	+ 2	- 6	- 5	19	AAH0573	TAAH4512

※ This color indicates our standard type.

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- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The user is requested to confirm degree of discoloration and contamination by using sample in the case of use contacting with the other items.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.

NBR Sheet (Acrylonitrile Butadiene Rubber Sheet)

Acrylonitrile Butadiene Rubber : Hycar

Features

● Excels in oil resistance

Applications

● Packing material for fuel

■ Properties : Black Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 100℃×72h		Compression Set 100℃×72h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %				
NBR Sheet -L <50>	51 (50)	8.1 {83}	550	+ 11	+ 3	- 34	- 8	+ 3	62		BGH5361	TNKL5005
<60>	60 (59)	9.4 {96}	560	+ 11	- 15	- 44	- 7	+ 32	75		BGH6351	TNKL6005
<70>	70 (67)	12.2 {124}	550	+ 6	+ 2	- 43	- 13	- 1	67	1.15	BGH7341	TNKL7007
<80>	82 (77)	8.4 {86}	420	+ 6	+ 12	- 35	- 7	+ 15	55		BGH8121	TNKL8005
<90>	90 (87)	8.6 {88}	360	+ 3	+ 18	- 6	- 3	+ 21	55	1.48	BGH9321	TNKL9007
NBR Sheet -M <30>	33 (27)	10.8 {110}	1030	+ 5	- 9	- 16	- 14	+ 15	44		BGH3371	TNKM3007
<40>	41 (37)	12.7 {129}	800	+ 5	- 40	- 20	- 16	+ 21	55		BGH4471	TNKM4010
<50>	53 (48)	12.2 {124}	710	+ 6	+ 4	- 43	- 19	+ 8	73		BGH5471	TNKM5010
<60>	61 (58)	10.8 {110}	570	+ 7	- 5	- 30	- 9	+ 8	55		BGH6461	TNKM6010
NBR Sheet -H <50>	52 (51)	14.6 {149}	610	+ 8	- 15	- 29	- 8	+ 21	27		BGH5571	TNKH5012
<60>	60 (56)	11.3 {115}	430	+ 6	0	- 25	- 10	- 1	52		BGH6461	TNKH6010
<70>	71 (70)	16.1 {164}	410	+ 7	- 5	- 34	- 6	+ 4	31		BGH7551	TNKH7012
<80>	82 (77)	12.5 {128}	350	+ 7	-9	- 41	+ 4	+ 14	69		BGH8421	TNKH8012
<90>	90 (84)	17.8 {182}	280	+ 5	+ 6	- 39	- 5	+ 9	56		BGH9421	TNKH9015
NBR Sheet <BG7661>	68 (61)	20.2 {206}	440	+ 7	- 15	- 40	- 8	+ 5	15		BGH7661	TNKH7017
Transformer NBR <70>	70 (65)	17.9 {183}	470	+ 4	+ 4	- 20	- 19	+ 15	20		BGH7551	TNKH7015

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■ Properties : Colored Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 100℃×72h		Compression Set 100℃×24h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %				
White NBR Sheet - <50>	50 (47)	11.1 {113}	690	+ 2	- 27	- 21	+ 4	+ 47	30		BGH5360	TNWL5005
<65>	65 (62)	9.8 {100}	730	+ 2	- 23	- 17	+ 3	+ 36	25	0.84	—	TNWL6507
Green NBR Sheet <70>	67 (64)	8.3 {85}	540	+ 4	- 32	- 25	+ 12	+ 59	25		—	TNML7007
Gray NBR Sheet <65>	66 (61)	9.1 {93}	540	+ 2	- 22	- 22	+ 6	+ 55	25		—	TNHL6507

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■ Properties : Weather Resistant Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 100℃×72h		CS 100℃×72h %	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %			
TNB5010-O_2	50 (49)	10.7 {109}	590	+ 9	+ 25	- 42	- 19	+ 1	57	BGH5471	TNKM5010-O_2
TNB6007-O_2	59 (56)	9.6 {98}	510	+ 4	+ 3	- 21	- 10	+ 9	45	BGH6331	TNKM6007-O_2
TNB7010-O_2	73 (69)	15.3 {156}	620	+ 5	+ 2	- 21	- 9	+ 4	48	BGH7451	TNKM7010-O_2
TNB9007-O_2	90 (81)	9.9 {101}	400	+ 3	+ 16	- 35	- 2	+ 17	59	BGH9321	TNKM9007-O_2

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■ Properties : Gasoline Resistant Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 25℃×72h / 100℃×72h		Compression Set 100℃×72h %	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	Petrol Volume Change Rate %	JIS#3 Volume change Rate %			
NBR-G <70>	73 (71)	18.2 {186}	280	+ 7	- 3	- 40	+ 9	- 2	34	BGH7451	TNKL7010-E

JIS K 6250

■ Properties : High Nitrile Butadiene Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 25℃×72h / 100℃×72h		Compression Set 100℃×72h %	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	Oil Resistance Volume Change Rate %	JIS#3 Volume change Rate %			
High NBR Sheet <70>	73 (71)	10.4 {107}	350	+ 4	+ 6	- 23	- 9	+ 1	12	BGH7351	TNKL7007-E

※ These items highlighted in this color are our standard products.

JIS K 6250

⚠
- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The user is requested to confirm degree of discoloration and contamination by using sample in the case of use contacting with the other items.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.

CR Sheet

Chloroprene Rubber Sheet

Features

- Excels in weather resistance
- Excels in oil resistance
- Heat resistance is better than NR and NBR

Applications

- Outdoor rubber mat
- Flame-retardant sheet

■ Properties : Black Rubber Sheet

Properties / Item Name		General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 100℃×72h		Compression Set 70℃×24h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %				
CR Sheet -L	<30>	30 (29)	7.5 {76}	670	+ 14	+ 19	- 24	+ 4	+ 133	21		BBH3260	TCKL3005
	<40>	40 (36)	7.9 {81}	540	+ 15	+ 20	- 15	+ 7	+ 125	20		BBH4260	TCKL4005
	<45>	44 (43)	6.6 {67}	440	+ 14	+ 11	- 41	- 2	+ 86	20	0.52	BCH0160	TCKL4505
	<50>	50 (49)	7.3 {75}	400	+ 15	+ 21	- 23	+ 4	+ 90	16		BCH5260	TCKL5005
	<55>	56 (56)	8.6 {88}	360	+ 14	+ 3	- 28	+ 6	+ 86	16		BCH0260	TCKL5505
	<65>	64 (63)	7.7 {79}	300	+ 14	+ 6	- 26	+ 14	+ 71	16	0.98	BCH0350	TCKL6507
	<70>	70 (69)	7.2 {74}	280	+ 15	+ 19	- 23	+ 5	+ 44	22		BCH7240	TCKL7005
	<80>	81 (78)	10.8 {110}	390	+ 8	- 3	- 31	+ 18	+ 99	19		BCH8320	TCKL8007
	<90>	91 (88)	10.6 {108}	190	+ 7	+ 18	- 32	+ 1	+ 54	21	1.74	BCH9320	TCKL9007
CR Sheet -M	<50>	49 (49)	13.9 {142}	690	+ 12	+ 5	- 3	- 3	+ 105	21		BCH5460	TCKM5010
	<60>	59 (55)	11.5 {117}	440	+ 12	- 2	- 34	- 4	+ 32	14		BCH6460	TCKM6010
	<70>	72 (72)	10.8 {111}	270	+ 7	+ 4	- 31	- 3	+ 30	19		BCH7450	TCKM7010
	<80>	81 (79)	11.8 {120}	200	+ 6	+ 10	- 32	- 3	+ 33	20		BCH8420	TCKM8010
CR Sheet -H	<40>	38 (36)	13.6 {139}	630	+ 15	- 5	- 21	- 6	+ 80	9		BCH4480	TCKH4012
	<50>	47 (44)	14.2 {145}	400	+ 10	- 1	- 22	- 2	+ 85	11		BCH5560	TCKH5014
	<60>	60 (59)	16.1 {164}	570	+ 8	- 12	- 28	+ 3	+ 83	17		BCH6560	TCKH6015
	<70>	70 (68)	16.2 {165}	310	+ 10	- 2	- 27	+ 4	+ 70	9		BCH7560	TCKH7014

JIS K 6250

■ Properties : Colored Rubber Sheet

Properties / Item Name		General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 100℃×72h		Compression Set 70℃×24h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %				
White CR-L Sheet	<50>	50 (49)	10.4 {106}	650	+ 11	- 10	- 28	+ 3	+ 86	16		BCH5260	TCWL5005
	<60>	63 (61)	8.0 {82}	630	+ 6	- 27	- 22	+ 20	+ 87	23	0.94	BCH6260	TCWL6006
	<70>	71 (67)	10.0 {102}	570	+ 5	- 19	- 29	+ 16	+ 82	35		BCH7240	TCWL7006
	<80>	83 (78)	8.1 {83}	390	+ 5	- 8	- 26	+ 22	+ 88	35		BCH8220	TCWL8006
Gray CR-L Sheet	<60>	60 (57)	9.0 {92}	590	+ 9	- 15	- 25	+ 22	+ 104	28		BCH6260	TCHL6006
Green CR-L Sheet	<60>	58 (54)	9.2 {94}	640	+ 3	- 28	- 30	+ 24	+ 114	22		BCH6260	TCML6005
Red CR-L Sheet	<60>	60 (56)	6.8 {69}	660	+ 9	- 30	- 27	+ 19	+ 115	37		BCH6260	TCRL6005

※ These items highlighted in this color are our standard products.

JIS K 6250

- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The user is requested to confirm degree of discoloration and contamination by using sample in the case of use contacting with the other items.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.

EPT Rubber Sheet (Ethylene-Propylene Terpolymer Rubber Sheet)

Ethylene-Propylene Rubber

Features

- Excels in weather resistance
- Excels in ozone resistance
- Excels in cold resistance
- Excels in heat resistance

Applications

- Seal material for window frame
- Bulletin Board

■ Properties : Black Rubber Sheet

Item Name \ Properties		General Properties: Hardness Type A	General Properties: Tensile Strength at Break MPa {kgf/cm²}	General Properties: Elongation at Break %	Heat-Resistant Aging 100℃×72h: Hardness Change Type A	Heat-Resistant Aging 100℃×72h: Change Rate of Tensile Strength %	Heat-Resistant Aging 100℃×72h: Change Rate of Elongation at Break %	Compression Set 70℃×24h %	Ozone Resistance Ozone 50pphm 40℃ 20% Elongation	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
EPT Sheet -L	<40>	43 (43)	16.6 {169}	720	+ 6	- 22	- 16	24	144h No Change		BAH4360	TEKL4007
	<50>	50 (49)	8.4 {86}	580	+ 10	- 5	- 26	23	〃		BAH5360	TEKL5007
	<60>	61 (61)	10.9 {112}	560	+ 8	- 1	- 22	22	〃		BAH6360	TEKL6007
	<65>	64 (62)	8.4 {86}	370	+ 9	- 5	- 47	20	〃		BAH0360	TEKL6507
	<70>	74 (72)	9.7 {99}	480	+ 5	- 4	- 32	24	〃	1.19	BAH7340	TEKL7007
	<80>	81 (79)	12.5 {128}	370	+ 9	- 8	- 32	31	〃		BAH8320	TEKL8010
	<90>	89 (87)	11.9 {122}	430	-	-	-	29	〃		BAH9320	TEKL9007
EPT Sheet -M	<50>	49 (47)	11.7 {119}	810	+ 5	- 25	- 40	16	1000h No Change		BAH5470	TEKM5010
	<60>	60 (59)	12.6 {129}	560	+ 8	- 3	- 32	10	〃		BAH6460	TEKM6010
	<65>	62 (61)	13.3 {136}	630	+ 5	- 6	- 31	11	〃	0.8	BAH0460	TEKM6510
	<70>	70 (69)	12.0 {122}	540	+ 5	+ 9	- 30	11	〃		BAH7450	TEKM7010
	<80>	77 (76)	13.8 {141}	440	+ 5	+ 9	- 22	14	〃		BAH8420	TEKM8010

JIS K 6250

■ Properties : Colored Rubber Sheet

Item Name \ Properties		General Properties: Hardness Type A	General Properties: Tensile Strength at Break MPa {kgf/cm²}	General Properties: Elongation at Break %	Heat-Resistant Aging 100℃×72h: Hardness Change Type A	Heat-Resistant Aging 100℃×72h: Change Rate of Tensile Strength %	Heat-Resistant Aging 100℃×72h: Change Rate of Elongation at Break %	Compression Set 70℃×24h %	Ozone Resistance Ozone 50pphm 40℃ 20% Elongation	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
White EPT Sheet -M	<65>	66 (63)	11.5 {117}	650	+ 4	- 26	- 17	35	1000h No Change	1.23	BAH0350	TEWM6507
Gray EPT Sheet -L	<60>	59 (57)	7.5 {77}	810	+ 4	- 26	- 39	35	72h No Change		BAH6360	TEHL6007
Gray EPT Sheet -M	<60>	62 (59)	9.0 {9.2}	660	+ 4	- 15	- 28	20	1000h No Change		BAH6360	TEHM6007

JIS K 6250

■ Properties : Special Rubber Sheet (Heat-resistant grade)

Item Name \ Properties		General Properties: Hardness Type A	General Properties: Tensile Strength at Break MPa {kgf/cm²}	General Properties: Elongation at Break %	Heat-Resistant Aging 100℃×72h: Hardness Change Type A	Heat-Resistant Aging 100℃×72h: Change Rate of Tensile Strength %	Heat-Resistant Aging 100℃×72h: Change Rate of Elongation at Break %	Compression Set 70℃×24h %	Ozone Resistance Ozone 50pphm 40℃ 20% Elongation	JIS K 6380 Corresponding No.	Item Number
EPT Special Sheet	<40>	40 (39)	10.3 {105}	660	+ 2	+ 4	0	19	1000h No Change	CAH4360	TEKH4007A
	<50>	53 (50)	11.6 {118}	550	+ 2	+ 5	+ 12	17	〃	CAH5470	TEKH5008A
	<55>	56 (53)	14.9 {152}	460	+ 7	+ 12	- 9	15	〃	CAH0470	TEKH5510A
	<60>	60 (57)	15.0 {153}	530	+ 5	+ 3	- 10	26	〃	CAH6360	TEKH6007A
	<70>	71 (66)	12.7 {130}	490	+ 2	0	- 7	16	〃	CAH7450	TEKH7008A
	<80>	80 (77)	16.3 {166}	300	- 3	+ 2	- 9	8	〃	CAH8450	TEKH8010A
	<90>	93 (91)	14.3 {146}	220	+ 2	+ 1	- 26	12	〃	CAH9420	TEKH9010A

※ These items highlighted in this color are our standard products.

JIS K 6250

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・These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
・The user is requested to confirm degree of discoloration and contamination by using sample in the case of use contacting with the other items.
・The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.

I I R Sheet (Isobutene-Isoprene Rubber Sheet)

Isobutylene-Isoprene Rubber : Butyl Rubber

Features

- Excels in chemical resistance
- Excels in gas permeability resistance
- Excels in heat aging resistance

Applications

- Packing material for air (gas) duct
- Acid resistant packing material

■ Properties : Black Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 70℃×72h		Compression Set 100℃×24h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %				
Butyl Sheet <40>	40 (38)	8.3 {85}	640	+ 11	+ 4	- 21	—	—	56		BAH4162	TIKM4004
<50>	50 (48)	7.1 {72}	600	+ 17	+ 9	- 35	—	—	67		AAH5261	TIKM5005
<65>	67 (65)	6.7 {68}	450	+ 12	+ 15	- 49	+ 64	+ 153	54	0.8	BAH0252	TIKM6505
<70>	72 (69)	8.4 {86}	360	—	—	—	—	—	—	—	—	TIKM7005

JIS K 6250

■ Properties : Colored Rubber Sheet

Properties / Item Name	General Properties			Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	
White Butyl Sheet <65>	64 (63)	9.0 {92}	600	TIWL6505
Gray Butyl Sheet <65>	67 (64)	11.4 {116}	790	TIHL6510

JIS K 6250

CSM Sheet (Chloro-Sulfonated Polyethylene Rubber Sheet)

Chloro-Sulfonated Polyethylene Rubber : Hypalon Rubber

Features

- Excels in acid / chemical resistance (strong acid)
- Excels in weatherability
- Excels in ozone resistance

Applications

- Acid resistant packing material

■ Properties : Black Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 100℃×72h		CS 100℃×24h %	Elastic Modulus in Static Shear Mpa	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %				
Hypalon Sheet <70>	69 (65)	17.4 {177}	270	+ 6	+ 9	+ 20	- 3	+ 56	62	1.03	BAH7451	THKM7010

JIS K 6250

■ Properties : Colored Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 100℃×72h		CS 70℃×24h %	JIS K 6380 Corresponding No.	Item Number
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume change Rate %			
White Hypalon Sheet <60>	59 (57)	14.2 {145}	640	+ 6	- 8	- 30	- 14	+ 40	40	BAH6460	THWM6010
Gray Hypalon Sheet <60>	64 (63)	15.3 {156}	600	+ 5	- 10	- 28	- 12	+ 36	38	BAH6460	THHM6012

※ These items highlighted in this color are our standard products.

JIS K 6250

⚠

・These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
・The user is requested to confirm degree of discoloration and contamination by using sample in the case of use contacting with the other items.
・The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.

SBR Sheet (Styrene Butadiene Rubber Sheet)

Styrene Butadiene Rubber

Features

- Excels in cold resistance
- Excels in heat resistance

Applications

- General packing and gasket material

■ Properties : Black Rubber Sheet

Properties / Item Name		General Properties			Heat-Resistant Aging 100℃ × 72h			Compression Set 100℃×24h %	JIS K 6380 Corresponding No.	Item Number
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %			
SBR Sheet	<50>	48 (48)	18.1 {184}	650	+ 2	- 21	- 22	24	AAH5455	TSKM5010
	<60>	60 (61)	8.2 {84}	410	+ 7	+ 19	- 12	23	AAH6363	TSKL6007
	<65>	66 (64)	8.9 {91}	340	+ 8	+ 4	- 16	22	AAH0233	TSKL6505
	<70>	68 (67)	12.8 {131}	470	+ 2	0	- 2	11	AAH7453	TSKM7010
	<90>	92 (89)	10.4 {106}	300	+ 2	+ 6	- 30	28	AAH9343	TSKL9007

JIS K 6250

■ Properties : Colored Rubber Sheet

Properties / Item Name		General Properties			Item Number
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	
Gray SBR Sheet	<50>	49 (47)	10.4 {106}	690	TSHL5005
White SBR Sheet	<75>	74 (69)	9.6 {98}	640	TSWL7507

JIS K 6250

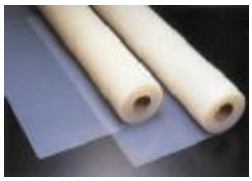
⚠

・These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
・The user is requested to confirm degree of discoloration and contamination by using sample in the case of use contacting with the other items.
・The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.

SR Sheet

(Silicone Rubber)

■ Silicone Rubber Sheet ■ High Precision Ultrathin sheet ■ FSR-100 (0.2)
■ SR Ultrathin Sheet ■ SG Sheet (N Type, F Type)



■ Silicone Rubber Sheet

Features

- Excels in ozone resistance and weather resistance.
- Usable in wide temperature range of -60～200℃.
- Excels in insulation resistance.

Applications

- Parts for electronic device
- Heat resistant packing material
- Electric isolating sheet

■ Properties : Silicone Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 250℃×72h			Oil Resistance 150℃×72h	Compression Set 180℃×24h %	JIS K 6380 Corresponding No.	Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	JIS#3 Volume Change Rate %			
SR-40	38 (38)	8.3 {85}	540	- 8	- 38	- 28	+ 61	17	GEH4260	—
SR-50	50 (50)	8.5 {87}	320	- 6	- 20	- 8	+ 48	16	GEH5250	General
SR-60	62 (62)	6.9 {70}	230	+ 2	- 9	0	+ 35	13	GEH6240	—
SR-70	70 (70)	7.1 {72}	290	+ 5	+ 6	- 46	+ 39	13	GEH7230	General
Red SR-40	40 (40)	7.5 {77}	410	- 8	- 21	- 7	+ 36	17	GEH4260	—
Red SR-50	50 (50)	9.3 {95}	350	- 4	- 18	- 12	+ 35	17	GEH5250	General
Red SR-60	60 (60)	7.5 {77}	250	+ 2	- 10	- 5	+ 35	13	GEH6240	—
Red SR-70	70 (70)	7.9 {81}	190	+ 2	- 8	- 16	+ 28	13	GEH7230	—
SR-1050	50 (50)	10.8 {110}	750	+ 12	- 30	- 58	+ 40	26	GEH5350	High-strength
SR-151	53 (53)	10.7 {109}	420	+ 7	+ 2	- 25	+ 38	22	GEH5350	—
ULSR	55 (55)	7.4 {75}	320	+ 4	- 10	- 25	+ 40	20	—	Flame resistance

※ Please consult us in advance because there is a case even general item might be a custom-made product depending on the size. JIS K 6250

※ These items highlighted in this color are our standard products.

■ SR Ultrathin Sheet

Features

- Excels in heat resistance.

Applications

- Parts for electronic device

■ Specification

Specification	Product Dimension (Standard Size)			Color Standard
	Thickness mm	Width m	Length m	
One surface : grain / the other : matte	0.2	1	2	Black

※ Although the standard length is 2M, it can be changed depending on an application

※ Thickness tolerance: ±0.05

■ High Precision Ultrathin SR Sheet (Mirror Surface)

Features

- Excels in flexibility, heat resistance, weather resistance and chemical resistance.
- Easy to handle by use of PET film as base material and excels in dimensional processability.

Applications

- Parts for electronic device

■ Properties : High Precision ultrathin SR Sheet Properties

Item Name	General Properties		
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %
High Precision Ultrathin SR Sheet	47	9.4 {96}	460

※ These properties were measured by 2mm thickness of test piece according to JIS.

■ Specification

Item Name	Product Dimension (Standard Size)			Surface Condition
	Thickness mm	Width m	Length m	
High Precision Ultrathin SR Sheet	0.1～0.3	500	10	Mirrored

※1 The following options are also available. Please consult us for more details.

- Shorter in width than 500mm by slit processing
- Slip size
- Rubber materials other than SR
- Surface conditions other than mirror surface (Pearskin finished, grain and etc)
- Adhered with PET film (Adhered product)

※2 This product shrinks approx. 2.5% in the case that the laminated PET film is peeled off.

⚠
- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.
- These products should be stored away from natural rubber products and synthetic rubber products because they can be easily contaminated depending on the storage environment.
- Please consult us in advance if there is a requirement in odor.

■ SG Sheet (N type, F type)

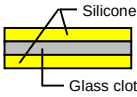
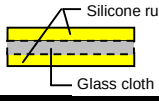
Features

- Excels in tensile strength.
- Excels in tear resistance.

Applications

- Parts for electronic device
- Various type of heat / cold resistant belt
- Packing material (dryer and business machine)
- For home electric appliances (electromagnetic cooking device)
- Cover for heavy industry machine

■ Structure and types

Item Name	Structure	Product Dimension (Standard Size) Thickness mm	Width m	Length m	Color Standard
N type	 Glass cloth sandwiched between silicone rubber	0.8 1.0 1.2 1.5	1	2	Red
F type	 Glass cloth impregnated with silicone rubber	0.25	1	2	Red

※ The standard length is 2m but can be freely changed in accordance with the application.

※ Specifying of the color is possible. (Please consult us in advance by reason of the necessity of a certain production lot.)

※ For SG sheet (N type) of which thickness is more than 2mm, the product name shall be "SR sheet with glass cloth" and the standard length is 2m.

■ FSR-100 (0.2)

Composite sheet of Teflon resin, silicone rubber and reinforcing cloth.

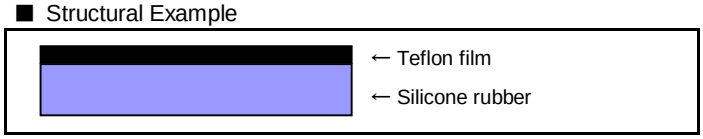
Features

- Excels in non-tackiness.
- Excels in chemical resistance.
- Excels in slipperiness.
- Excels in heat resistance.

Applications

- Diaphragm
- Cushion

■ Structural Example



■ Dimension

Item Name	Thickness mm	Width m	Length m
FSR-100 (0.2)	0.5～3.0	1	2

※ Please consult us on sizes other than the above listed.

- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.
- These products should be stored away from natural rubber products and synthetic rubber products because they can be easily contaminated depending on the storage environment.
- Please consult us in advance if there is a requirement in odor.

FR Sheet

Fluoro Rubber Sheet

Features

- Excels in chemical, oil, and solvent resistance.
- Excels in weather and ozone resistance.
- Excels in heat aging resistance more than silicone rubber.

Applications

- Special packing material
- Corrosive-resistant packing material

■ Properties : FR Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 275℃×72h			Oil Resistance 150℃×72h JIS#3		Compression Set 150℃×72h %	Volume Resistivity Value Ω・cm	Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	Hardness Change Type A	Volume Change %			
TFB 8010	81 (76)	16.0 {163}	230	+ 7	- 13	- 39	- 2	- 4	20	—	Low strain type
FR Sheet <Hs80>	78 (73)	12.5 {128}	430	+ 5	- 52	+ 1	- 3	+ 2	67	1.0×10^{12}	Electric isolating type

※ The item highlighted in this color is our standard product.

JIS K 6250

※ TFB 8010 is not an electric isolating type.

Aflas Rubber Sheet

(Aflas: Trade name of fluoro rubber of Asahi Glass Co., Ltd.)

Features

- Excels in inorganic chemical resistance.
- Excels in heat aging resistance.
- Excels in steam resistance.

Applications

- Packing material for steam ducting
- Heat resistant and non-contaminating packing material

■ Properties : Aflas Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 260℃×10 days			Oil Resistance 100℃×72h JIS#3		Compression Set 150℃×72h %	Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	Hardness Change Type A	Volume Change %		
Aflas Rubber Sheet	82 (75)	17.6 {180}	210	0	- 50	- 4	- 5	+ 7	27	Special order product

JIS K 6250

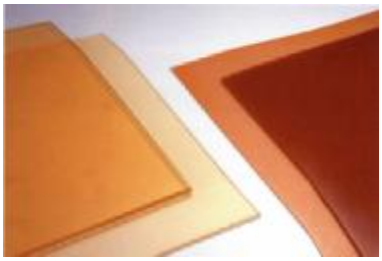
■ Properties : Aflas Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 250℃×72 days			Oil Resistance 150℃×72h JIS#3	Compression Set 150℃×72h %	Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	Volume Change %		
Aflas Rubber Sheet (long)	73 (66)	10.5 {107}	430	+ 1	- 22	- 20	+ 13	26	Special order product

JIS K 6250

Urethane Rubber Sheet

(Ti-Prene Sheet)



Features

- Excels especially in mechanical strength.
- Has over 10 times more abrasion resistance than that of natural rubber.
- Excels in oil resistance, especially in mineral oil.
- Excels in ozone resistance.
- Endowed with the highest strength among elastic materials, and has a great load bearing capacity.
- Tough and hard but yet excels in elasticity.
- Colored sheets are also available.

Applications

- Packing
- Cushion material
- Seal material
- Scraper
- Automotive parts

※Avoid using continuously at 70 degrees C or more.
※Not complies with Japanese food hygiene law (Japanese Ministry of Health, Labour and Welfare
Notification No. 201)

■ Properties : Urethane Rubber Sheet

Properties / Item Name	Specific Gravity	General Properties: Hardness Type A	General Properties: Tensile Strength at Break MPa {kgf/cm^2}	General Properties: Elongation at Break %	Tensile Stress M_{300} MPa {kgf/cm^2}	Tear Resistance kN/m {kgf/cm}	Compression Set 70℃×24h %	Abrasion Loss cc/1000times	Impact Resilience %	Remarks
TR 100-90	1.22	91 (89)	52.1 {531}	430	21.2 {216}	90.3 {92}	27	0.080	34	Standard material (Polyester basis)
TR 100-70	1.20	70 (69)	27.7 {283}	630	3.6 {36.7}	36.4 {37}	28	0.200	50	
TR 100-60	1.20	60 (60)	23.7 {242}	740	3.2 {33}	36.6 {37}	37	0.300	40	
TR 100-50	1.24	50 (50)	26.6 {271}	610	2.5 {26}	28.6 {29}	3	0.100	31	
TR 200-90	1.13	91 (89)	35.1 {358}	430	21.7 {221}	86.8 {89}	30	0.370	37	Standard material (Polyether basis)
TR 1000-90	1.13	90 (90)	42.0 {429}	450	16.0 {163}	74.7 {76}	24	0.080	50	Special grade (Polyether basis)

※ Abrasion loss is by Akron abrasion test. ※Please consult us about various grades other than listed above. JIS K 6250

■ Dimension

Thickness (mm)	Tolerance (mm)	Thickness Deviation (mm)	Width (m)	Length (m)	TR200-90	TR100-90	TR100-70	TR100-60	TR100-50
1	+0.15 -0.1	0.2	1	2	○	○	○	○	○
1.5	+0.15 -0.1	0.2			○	○	○	○	○
2	+0.2 -0.1	0.2			○	○	○	○	○
3	±0.2	0.2			○	○	○	○	○
4	±0.2	0.2			○	○	○	○	○
5	+0.3 -0.2	0.3			○	○	○	○	○
6	+0.3 -0.2	0.3			○	○	○	○	○
7	±0.3	0.3			○	○	○	○	○
8	±0.3	0.3			○	○	○	○	○
9	±0.3	0.3			○	○	○	○	○
10	±0.3	0.3			○	○	○	○	○
12	±0.4	0.4			○	○	○	○	○
15	±0.5	0.5			○	○	○	○	○
20	+1.5 0	0.8			○	○	○	○	○
25	+1.5 0	0.8			○	○	○	○	○
30	+1.5 0	0.8			○	○	○	○	○
35	+2.0 0	1.0			○	○	○	△	△
40	+2.0 0	1.0			○	○	○	○	○
45	+2.5 0	1.5			○	○	○	△	△
50	+2.5 0	1.5			○	○	○	○	○
55	+2.5 0	1.5	1	1	○	△	△	△	△
60	+2.5 0	1.5			○	○	△	△	△
70	+2.5 0	1.5			○	○	△	△	△
80	+3.0 0	2.0			○	△	△	△	△
90	+3.0 0	2.0			○	△	△	△	△
100	+3.5 0	2.0			○	△	△	△	△

○: Available △: Please consult us. ※ Please consult us on grades and sizes other than listed above.

- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The user is requested to confirm degree of discoloration and contamination by using sample in the case of use contacting with the other items.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.

Sponge Sheet

- ■ Highly Foamed SR Sponge Sheet
- ■ Low Foamed SR Sponge Sheet
- ■ SR Conductive Sponge Sheet
- ■ SR Flame Retardant Sponge Sheet

■ Highly Foamed Silicone Rubber Sponge Sheet

Features

- ● Excels in heat insulating properties
- ● Generally usable in wide temp. range of -60～+200℃, depending on the degree of compression.
- ● Closed cell structure
- ● Excels in impact resilience
- ● Expansion ratio: Approximately 4 fold
- ● Softer and smoother than Low Foamed Silicone Rubber Sponge Sheet, and has fine-cell geometry.

Applications

- ● Various gaskets, packings and etc.
- ● Heat resistant packing material
- ● Heat resistant cushion materials
- ● Heat insulating material
- ● Electronic parts, electrical parts and automobile parts

■ Properties : Highly Foamed Silicone Rubber Sponge Sheet

Properties / Item Name	Apparent Density g/cm³	General Properties			Compression Set 150℃×24h %	Heat-Resistant Aging 230℃×72h			Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %		Hardness Change Type E	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %	
SR Sponge Sheet E15	0.3	15 (15)	1.00 {10.2}	250	8	+ 2	- 55	- 48	Red

※ Condition of compression set : Measured in 3hrs after removing 40% compression load. JIS K 6250

※ Please consult us about low hardness type (10°), middle hardness type (20°) and high hardness type (30°) other than listed above.

※ Please consult us on colors other than the above mentioned standard color.

■ Dimension

Thickness (mm)	Tolerance (mm)	Width × Length (mm)	Surface Condition	
			Both sides skin	One side skin
1.5	± 0.3	500 × 500	×	△
2	± 0.4		×	○
3	± 0.4		×	○
4	± 0.4		○	○
5	± 0.5		○	○
6	± 0.5		○	○
7	± 0.7		○	△
8	± 0.8		○	△
10	± 1.0		○	○
12	± 1.0		○	△
15	± 1.5		○	○
20	± 2.0		○	×
30	± 3.0		○	×

■ Heat Thermal Conductivity

Properties / Item Name	Heat Thermal Conductivity W / (m･K)
SR Sponge Sheet E15	5.0×10^{-2}

※ Test method :
Shibayama's acetone-benzene process
Conforming to ASTM D4351

○ : Available
× : Unavailable
△ : Please consult us.

※ Please consult us on sizes other than the above listed.

- ･These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- ･The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.
- ･These products should be stored away from natural rubber products and synthetic rubber products because they can be easily contaminated depending on the storage environment.
- ･Please consult us in advance if there is a requirement in odor.

■ Low Foamed Silicone Rubber Sponge Sheet

Features

- Excels in heat insulating properties and impact resilience
- Generally usable in wide temp. range of -60～+200℃, depending on the degree of compression.
- Expansion ratio: Approximately double
- Larger size is available than Highly Foamed Silicone Rubber Sponge Sheet

Applications

- Various gaskets, packings and etc.
- Heat resistant cushion materials
- Heat insulating material
- Heat insulation materials
- Electronic parts, electrical parts and automobile parts

■ Properties : Low Foamed Silicone Rubber Sponge Sheet

Properties / Item Name	Apparent Density g/cm³	General Properties			Compression Set 150℃×24h %	Heat-Resistant Aging 230℃×72h			Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %		Hardness Change Type E	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %	
SPO-35R1	0.54	35 (35)	4.9 {50}	370	19	- 12	- 54	- 20	Red

※ Condition of compression set : Measured in 30 min. after removing 25% compression load. JIS K 6250

※ Please consult us on colors other than the above mentioned standard color. ※ Please consult us on grades other than listed above.

■ Dimension

Thickness (mm)	Tolerance (mm)	Width × Length (mm)
2	± 0.5	1 × 2
3	± 0.5	
4	± 0.5	
5	± 0.5	
6	± 0.6, - 0.5	
7	± 0.7, - 0.5	

Thickness (mm)	Tolerance (mm)	Width × Length (mm)
8	+ 0.8, - 0.5	1 × 2
10	+ 1.0, - 0.5	
11	+ 1.1, - 0.5	
12	+ 1.2, - 0.5	
15	+ 1.5, - 0.75	
20	+ 2.0, - 1.0	

■ Heat Thermal Conductivity

Properties / Item Name	Heat Thermal Conductivity W / (m･K)
SPO-35R1	7.4×10^{-2}

※ Test method :
Shibayama's acetone-benzene process
Conforming to ASTM D4351

Surface condition : with both side skin ※ These items highlighted in this color are our standard products.

※ 1m × 3m is also available as custom made product. ※ Please consult us on sizes other than listed above.

■ Conductive SR Sponge Sheet (Custom-Made Product)

Features

- Silicone foaming sheet added carbon as conductive agent
- Expected effects such as heat insulation, sound insulation, vibrational absorption, weight saving and etc.
- Expansion ratio: Approximately 3 fold

Applications

- Various gaskets, packings, etc. of antistatic
- Various cushioning material
- Electronic parts, electrical parts
- Automotive parts

■ Properties : Conductive SR Sponge Sheet

Properties / Item Name	Apparent Density g/cm³	General Properties			Compression Set 150℃×24h %	Heat-Resistant Aging 230℃×72h			Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %		Hardness Change Type E	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %	
Conductive SR Sponge Sheet E20	0.4	20 (20)	0.83 {8.50}	270	40	+ 4	- 4	- 42	Black

※ Condition of compression set : Measured in 3hrs after removing 40% compression load. JIS K 6250

■ Dimension

Thickness (mm)	Tolerance (mm)	Width × Length (mm)	Surface Condition	
			Both sides skin	One side skin
1.5	± 0.3	500 × 500	×	△
2	± 0.4		×	△
3	± 0.4		×	○
4	± 0.4		×	△
5	± 0.5		○	○
6	± 0.5		○	○
7	± 0.7		△	△
8	± 0.8		△	△
10	± 1.0		○	△
12	± 1.2		○	×

■ Electrical Property

Properties / Item Name	Volume Resistivity Ω ･ cm
Conductive SR Sponge Sheet E20	4.8×10^{4}

※ Test method : SRIS 2301 (Volt-ampere method)

○ : Available
× : Unavailable
△ : Please consult us.
※ Please consult us on sizes other than the above listed.

- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.
- These products should be stored away from natural rubber products and synthetic rubber products because they can be easily contaminated depending on the storage environment.
- Please consult us in advance if there is a requirement in odor.

Sponge Sheet

■ Flame-Retardant SR Sponge Sheet

<Flame-Retardancy>
2.1mm(t) : Equivalent to UL94HBF
5.0mm(t) : Equivalent to UL94V-O

Features

- Excels in flame-retardancy
- Expansion ratio: Approximately 3.5 fold

Applications

- Various gaskets, packings and etc.
- Heat resistant cushion materials
- Heat insulating materials
- Electronic parts, electrical parts and automobile parts

■ Properties : Flame-Retardant SR Sponge Sheet

Properties / Item Name	Apparent Density g/cm³	General Properties			Compression Set 150℃×24h %	Heat-Resistant Aging 230℃×72h			Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %		Hardness Change Type E	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %	
Flame-Retardant SR Sponge Sheet E20	0.4	23 (22)	0.71 {7.20}	190	16	+ 2	- 30	- 45	Gray

※ Condition of compression set : Measured in 3hrs after removing 40% compression load.

JIS K 6250

■ Dimension

Thickness (mm)	Tolerance (mm)	Width × Length (mm)	Surface Condition	
			Both sides skin	One side skin
1.5	± 0.3	500 × 500	×	△
2	± 0.4		×	○
3	± 0.4		×	○
4	± 0.4		○	△
5	± 0.5		○	○
6	± 0.5		○	△
7	± 0.7		△	△

Thickness (mm)	Tolerance (mm)	Width × Length (mm)	Surface Condition	
			Both sides skin	One side skin
8	± 0.8	500 × 500	△	△
10	± 1.0		○	○
12	± 1.2		△	△
15	± 1.5		○	○
20	± 2.0		○	×
30	± 3.0		○	×

○ : Available
× : Unavailable
△ : Please consult us.
※ Please consult us on sizes other than the above listed.

- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.
- These products should be stored away from natural rubber products and synthetic rubber products because they can be easily contaminated depending on the storage environment.
- Please consult us in advance if there is a requirement in odor.

■ FR Sponge Sheet

Features

- Excels in heat resistance
- Excels in solvent resistance (Particularly highly-polar solvent)
- Excels in acid, alkali, alcohol, and oil resistance.
- Excels in weather and ozone resistance.
- Expansion ratio: Approximately 4.5 fold

Applications

- Electronic parts and electrical parts
- Various packing materials
- Heat resistant cushion materials

■ Properties : FR Sponge Sheet

Properties / Item Name	Apparent Density g/cm^3	General Properties			Tension Set %	Impact Resilience %	Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %			
FR Sponge Sheet	0.42	36 (36)	2.7 {27.5}	270	9	16	Black

JIS K 6250

■ Dimension

Thickness (mm)	Tolerance (mm)	Width × Length (mm)	Surface Condition		
			Both sides skin	One side skin	Without skin
2	± 0.4	300 × 300	×	○	
3	± 0.4		×	○	
4	± 0.4		○	△	
5	± 0.5		×	○	
6	± 0.5		○	△	
7	± 0.7		○	△	
10	± 1.0		○	×	
5	± 0.5	500 × 500	○	○	
6	± 0.5		○	△	
10	± 1.0		○	×	
2	± 0.5	M × M	×	×	○
3	± 0.5		×	×	○
5	± 0.5		×	○	×
10	+ 1.5, - 1.0		○	×	×

○ : Available
× : Unavailable
△ : Contact us
※ Please consult us on sizes other than the above listed.

■ Compression Set

Test Condition	%
20℃ × 24h	6
70℃ × 24h	73
100℃ × 24h	81

JIS K 6250

■ Heat Thermal Conductivity

Heat Thermal Conductivity W / (m･K)
5.8 × 10^{-2}

※ Test Method : JIS R 2618

■ Heat Resistant Aging

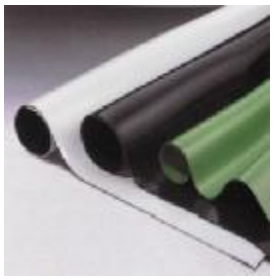
Test Condition	Hardness Change Type E	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %
150℃ × 72h	+ 4	+ 11	- 19
200℃ × 72h	+ 5	+ 15	- 11
250℃ × 72h	+ 5	- 6	+ 7

※ Condition of compression set : Measured in 3hrs after removing 40% compression load. JIS K 6250

- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it by using sample in the case of use under severe condition.
- These products should be stored away from natural rubber products and synthetic rubber products because they can be easily contaminated depending on the storage environment.
- Please consult us in advance if there is a requirement in odor.

Conductive Rubber Sheet

■ EP Sheet (EP-2 and EP-5 Type) ■ ECC - 8 Sheet ■ EC - 8H Sheet ■ ESR Sheet
■ EC Sheet ■ EC - 8N (Cloth-inserted) Sheet ■ ECC - 8H Sheet



■ EP Sheet (EP-2 Type, EP-5 Type)

■ Type

EP-2	Volume Intrinsic Resistivity $10^2\,\Omega\cdot$cm type (Material : 3 types : Natural rubber, CR system, NBR system)
EP-5	Volume Intrinsic Resistivity $10^5\,\Omega\cdot$cm type (Material : 3 types : Natural rubber, CR system, NBR system)

■ Properties : EP Sheet

Properties / Item Name		Unit	EP-2			EP-5		
			REP-2 (Natural Black Rubber)	CEP-2 (CR Black Rubber)	NEP-2 (NBR Black Rubber)	REP-5 (Natural Black Rubber)	CEP-5 (CR Black Rubber)	NEP-5 (NBR Black Rubber)
General Properties	Hardness	Type A	65 (65)	62 (60)	72 (69)	72 (72)	72 (71)	73 (71)
	Tensile Strength at Break	MPa {kgf / cm^2}	15.7 {161}	12.5 {128}	21.3 {217}	16.2 {166}	12.0 {123}	9.9 {101}
	Elongation at Break	%	410	310	430	310	230	250
Heat Aging Resistance	—	Test Condition	70℃ × 72h	100℃ × 72h	100℃ × 72h	70℃ × 72h	100℃ × 72h	100℃ × 72h
	Hardness Change	Type A	+ 6	+ 18	+ 8	+ 3	+ 16	+ 10
	Change Rate of Tensile Strength at Break	%	- 15	- 10	- 4	- 5	- 2	+ 6
	Change Rate of Elongation at Break	%	- 33	- 40	- 32	- 24	- 49	- 42
Compression Set		Test Condition	70℃ × 24h	100℃ × 72h	100℃ × 72h	70℃ × 24h	100℃ × 72h	100℃ × 72h
		%	20	35	34	13	35	47
Oil Resistance	—	Test Condition	70℃ × 24h	100℃ × 72h	100℃ × 72h	70℃ × 24h	100℃ × 72h	100℃ × 72h
	JIS #1 Volume Change Rate	%	—	+ 13	- 3	—	+ 19	- 1
	JIS #3 Volume Change Rate	%	—	+ 92	+ 28	—	+ 95	+ 29
Volume Intrinsic Resistivity	Before heat aging	Ω·cm	0.9 × 10^2	1.2 × 10^2	1.2 × 10^2	5.1 × 10^4	1.4 × 10^4	8.6 × 10^4
	After heat aging	Test Condition	70℃ × 24h	100℃ × 72h	100℃ × 72h	70℃ × 24h	100℃ × 72h	100℃ × 72h
		Ω·cm	1.2 × 10^2	0.5 × 10^2	1.7 × 10^2	—	—	—

※ Thickness of the product is 1-100mm ※ Please consult us for a conductivity depends on its usage. JIS K 6250

※ Volume Resistivity : Please refer to Page 23

■ EC Sheet : Consists of sheet of one color.

■ ECC - 8 Sheet : Consists of laminate of colored sheet (1mm) and black colored sheet.

(e.g.) ← EC-8 (Green)
← NEP-5 (Black)

■ Properties : EC Sheet / ECC-8 Sheet

Properties / Item Name	Unit	EC-8 (ECC-8)
Hardness	Type A	70 (62)
Volume change modulus by JIS #1 oil	%	+ 1
Volume change modulus by JIS #3 oil	%	+ 35
Volume intrinsic resistivity before aging	Ω·cm	7.9 × 10^8
Volume intrinsic resistivity after aging 70℃ X 72h	Ω·cm	2.5 × 10^8

■ Dimension

Item Name	Thickness mm	Standard	
		Thickness mm	Length m
EC	1-100	1-3 4-10 12-20	10 5 5
ECC	2-100	20-50 55-100	2 1

※ Volume Intrinsic Resistivity : Please refer to Page 23

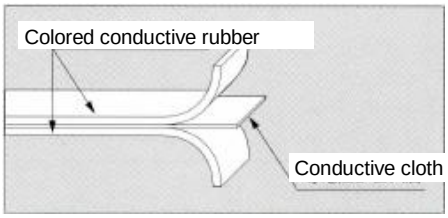
※ Color tone : Green is standard but please consult us regarding other colors.

■ EC-8N (Cloth-inserted) Sheet　　Volume Resistivity $10^8\Omega$, cm type

Features

- Construction without back or front making it free of "distortion" and "warpage" caused by prolonged use.
- In addition to the high surface hardness, cloth is filled in the middle making the movement of casters and trucks smooth.
- NBR formulation makes it excellent in oil resistance and chemical resistance.

■ Structure



■ Dimension

Thickness mm	Width m	Length m	Color Standard
2	1	10	Green
3	1	10	Green

※ Please consult us on the other colors and sizes

■ EC - 8H Sheet
■ ECC - 8H Sheet

Features

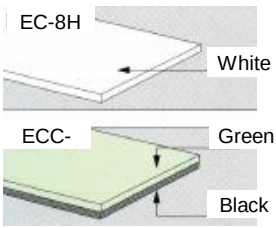
- Optimum hardness against writing instrument pressure.
- EC-8H Sheet is a colored type with white as standard.
- High in surface hardness making the movement of casters and trucks smooth.

Applications

- Drawing board of automatic drafting machine
- Suited for tables and etc. to write words.

※The standard color of ECC-8H is green.
Please consult us on the other colors.

■ Structure



■ Properties :　EC-8H / ECC-8H Sheet

Properties / Item Name	General Properties			Volume Intrinsic Resistivity Ω・cm
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	
EC-8H	95 (93)	9.4 {96}	160	6×10^9
ECC-8H	80	10.8 {110}	380	4.3×10^8
ECC-8H	90	8.0 {82}	600	2.7×10^9

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■ Dimension

Item Name	Thickness mm	Width m	Standard	
			Thickness mm	Length m
EC-8H	1-100	1	1-3 4-10 12-20 20-50 55-100	10 3 2 2 1
ECC-8H	2-100	1		

■ ESR Sheet

Features

- High-conductive type
- Excels in heat, ozone, and weather resistance because of silicone rubber.
- Both side matte surface is the standard type.

Applications

- Parts for electronic device

■ Properties : ESR Sheet

Properties / Item Name	General Properties			Compression Set 180°C×24h %	Volume Intrinsic Resistivity Ω・cm
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %		
ESR	72 (72)	5.9 {60}	140	26	5×10^{0}

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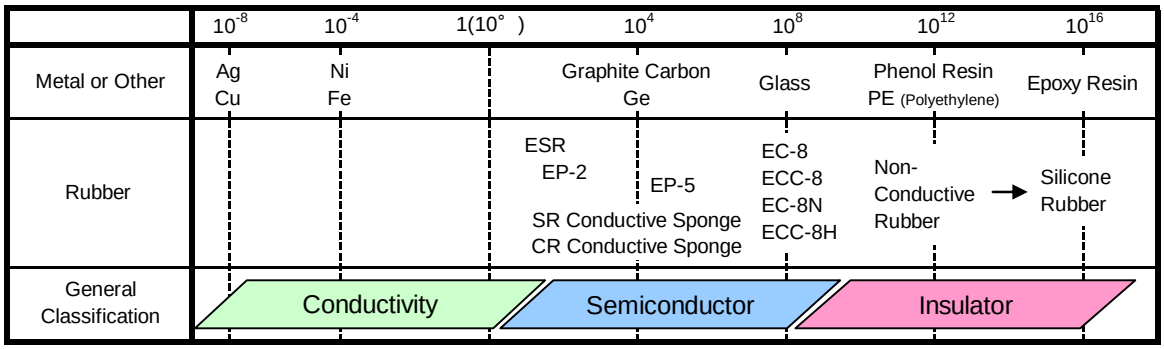
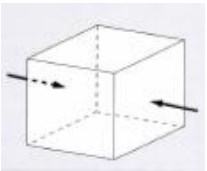
Volume Intrinsic Resistivity

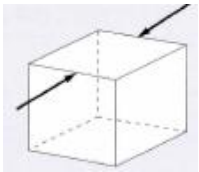


Volume Intrinsic Resistivity



Resistance which depends on object type at carrying an electric current through inside of the object. Defined with resistance between facing sides of cubic.
Unit is Ω・cm.

Surface Intrinsic Resistivity



Resistance which depends on object type and surface condition at carrying an electric current through a surface of the object. Defined with resistance between facing sides of square.
Unit is Ω.

Measurement Test Result of Leak Resistance of Workfloor

■ Resistivity Value

Conductive property test of antistatic conductive mat (Measurement of leak resistance)

■ Test Sample

Name : Conductive mat

Type : ECC-8

Size : Thickness 2.0mm,
Width 1,020mm,
Length 10,400mm

■ Test Method

According to 7.5, "Antistatic product structural criteria (1984 Revised ver.)", Engineering guideline of National Institute of Industrial Safety of Department of Labor (RIIS-TR-84-1)

Technology Institution of Industrial Safety

■ Test Result of Leak Resistance

(Biggest value among 5 points of leak resistance measurement: Rmaximum)
Rmaximum=4.8×10^{6} (Ω)
(Applied voltage 100V D.C.)

■ Leak Resistance of Each Position of Conductive Mat

Leak resistance between earth terminal and each measurement position.

Measurement Position	Leak Resistance (Ω)
①	3.1×10^{6}
②	3.6×10^{6}
③	4.0×10^{6}
④	3.6×10^{6}
⑤	4.8×10^{6}

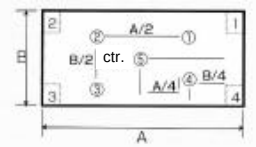
(Applied voltage 100V D.C.)

■ Other

1) Test sample size
Length A = 10,400mm,
Width B = 1,020mm,
Thickness t = 2.0mm

2) Earth terminal position 3

3) Measurement position



4) Electrode (Metal cylinder)
Major axis 60mm, Weight 10kgf,
Material SUS304

5) Test temperature and humidity
Temp. 24℃, RH 60%

Non-Conductive Rubber Sheet

Features

- Excels in high-voltage resistance

Applications

- For high-voltage equipment

■ Properties : Non-Conductive Rubber Sheet

Item Name \ Properties	General Properties			Breakdown Voltage kv/mm	Material
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %		
Black N/C (M) Rubber Sheet	60 (60)	9.9 {101}	530	22.6	NR (Black)
Amber Rubber Sheet (60%) <45>	47 (47)	19.1 {195}	680	18.6	NR (Amber)
TAB 5007 SO_2	48 (48)	11.3 {115}	680	15.0	W/R NR (Black)
TAB 6007 SO_2	60 (58)	14.3 {146}	650	22.0	W/R NR (Black)
N/C EPT Sheet <40>	40 (39)	10.3 {105}	660	15.0	EPT (Black)
<50>	51 (48)	11.9 {121}	560	21.2	EPT (Black)
<60>	60 (58)	7.4 {76}	530	22.0	EPT (Black)
<65>	61 (60)	10.0 {102}	600	22.1	EPT (Black)
TCB 4012 S	38 (36)	13.6 {139}	630	7.5	CR (Black)
TCB 7010 S	69 (67)	18.1 {185}	360	7.5	CR (Black)
TNB 9012 S	90 (88)	15.0 {153}	340	7.4	NBR (Black)
SR-50 <50>	50 (50)	8.5 {87}	320	18.8	SR (Natural)
FR Sheet <80>	78 (73)	15.3 {156}	380	6.8	FR (Black)

※ N/C: Non-Conductive W/R: Whether Resistance

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※ Allowable voltage should be regarded approx. 1/3 of the breakdown voltage only as a guide.

※ The above mentioned FR Sheet <80> is not "TBF8010", but non-conductive FR sheet.

Food Grade Rubber Sheet

Features

- Complies with Japanese food hygiene law "Japanese Ministry of Health and Welfare Notification No.85 (Japanese Ministry of Health, Labour and Welfare Notification No.201)" including extraction of acetic acid.

※ Please check the adequacy and safety of these items for the intended applications before use

■ Properties : Food Grade Rubber Sheet

Item Name \ Properties	General Properties			Material	Operation Temperature
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %		
TEB 6510 Z	60 (57)	12.8 {131}	730	EPT	Less than 100℃
White Butyl Sheet <65>	67 (66)	8.4 {85}	600	IIR	Less than 100℃
White EPT Sheet <65>	66 (63)	9.6 {98}	690	EPT	Less than 100℃
SR-50	50 (50)	8.5 {87}	320	SR	100℃ or higher
SR-70	70 (70)	7.1 {72}	290	SR	100℃ or higher

Rubber Sheet for Waterworks

Features

- Complies with the standard of rubber sheet for waterworks specified in JIS K 6353

Applications

- Various packing material for waterworks

※ Please check the adequacy and safety of these items for the intended applications before

■ Properties : Rubber Sheet for Waterworks

Item Name \ Properties	General Properties			Extraction Test				Material	Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Turbidity	Color	$KMnO^4$ Consumption	Chlorine loss		
S-0360	60 (59)	18.3 {187}	530	Less than 0.1	1 or less	1.8	0.7	SBR	Complies with 60, class 3
S-0375	73 (72)	20.9 {213}	430	Less than 0.1	1 or less	1.8	0.6	SBR	Complies with 75, class 3
C-0360	58 (56)	17.9 {183}	410	Less than 0.1	1 or less	1.0	0.4	CR	Complies with 60, class 3
A-0160	56 (56)	22.2 {226}	470	Less than 0.1	1 or less	1.4	0.4	NR	Complies with 60, class 1
E-0375	73 (71)	12.4 {126}	570	Less than 0.1	1 or less	1.0	0.4	EPT	Complies with 75, class 3

Conforming Sheet of Expressway Standard

Features

- Complies with each standard

■ Properties : Conforming Sheet of Expressway Standard

Properties / Item Name	General Properties			Heat-Resistant Aging 70℃×168h			Ozone Resistance Ozone 100 pphm 40℃×40% Elongation
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm2}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength at Break MPa {kgf/cm2}	Change Rate of Elongation at Break %	
Gray EPT Sheet	61 (58)	9.9 {101}	720	+ 4	8.6 {88}	600	96h No change

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■ Properties : Conforming Sheet of NEXCO structural construction guidelines

Properties / Item Name	Elastic Modulus in Static Shear MPa {kgf/cm^2}	General Properties			Heat-Resistant Aging 70℃×72h		Ozone Resistance Ozone 50 pphm 40℃×20% Elongation
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm2}	Elongation at Break %	20% Elongation Stress Change Rate %	Change Rate of Elongation at Break %	
Vibration Isolation Rubber C-8	0.78 {8.0}	53 (53)	17.1 {174}	510	+ 29	+ 1	96h No change
Vibration Isolation Rubber C-10	0.98 {10.0}	61 (57)	16.2 {165}	450	+ 35	- 7	96h No change

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Properties / Item Name	Elastic Modulus in Static Shear MPa {kgf/cm^2}	General Properties			Heat-Resistant Aging 70℃×72h		Compression Set 70℃×24h %	Ozone Resistance Ozone 50 pphm 40℃×20% Elongation
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm2}	Elongation at Break %	20% Elongation Stress Change Rate %	Change Rate of Elongation at Break %		
SBR Sheet (Structural construction guideline	1.18 {12}	66 (62)	6.5 {66}	390	+ 25	- 14	27	96h No change

JIS K 6250

Vibration Isolation Rubber Sheet

Features

- Complies with JIS standard for vibration isolation rubber.

■ Properties : Vibration Isolation Rubber Sheet

Properties / Item Name	Elastic Modulus in Static Shear MPa {kgf/cm^2}	General Properties			Oil Resistance 100℃×72h JIS #3 Volume Change Rate %	Heat-Resistant Aging 100℃×72h		Compression Set 100℃×24h
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %		25% Elongation Stress Change Rate %	Change Rate of Elongation at Break %	
Vibration Isolation R/S (C-06)	0.52 {5.3}	43 (42)	9.7 {99}	530	+ 109	+ 46	- 24	22
(C-08)	0.78 {8.0}	53 (53)	17.1 {174}	510	+ 74	+ 72	- 23	13
(C-10)	0.97 {9.9}	61 (59)	9.8 {100}	370	+ 98	+ 77	- 40	35
(C-12)	1.09 {11.1}	63 (61)	13.5 {138}	360	+ 70	+ 36	- 6	21

R/S=Rubber Sheet

JIS K 6250

Simple Rubber Bearing

Features

- It has an ability to spread impact load or sectional load evenly and so is able to loosen its structural load.
- Excels in weather, ozone, and water resistance, compression set and etc.
  Complies with the standard of Japan Road Association and Japan Rubber Bearing Association.

■ Properties : Simple Rubber Bearing

Item Name	Application	Structure		
		Stretchable Absorption		Strain Controlled Material
		Material	Elastic Modulus in Static Shear	
Ti-fiber	Fixing hard rubber	CR	—	—
Ti-span	Laminated sheet of simple rubber bearing	CR	0.98±0.10 {10±1.0}	Ti-fiber
Vibration Insulation CR (C-10)	Movable hard rubber	CR	0.98±0.10 {10±1.0}	—
SBR Sheet (Structural construction guideline	Mesnager hinge B type rubber bearing	SBR	1.18±0.12 {12±1.2}	—

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Bridge Collapse Preventing Cushion Rubber

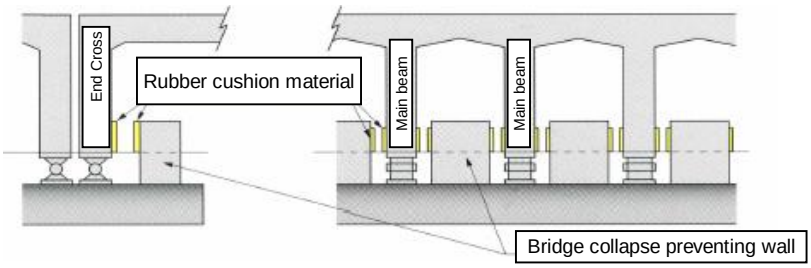
TCKL 5505

Features

- Chloroprene rubber cushion material of bridge collapse protection (Bridge collapse protective wall, PC cable, etc.) with property value comply with the reference of Japan Road Association

■ Properties : Bridge Collapse Preventing Cushion Rubber

Hardness	Type A	55±5
Allowable bearing stress	MPa {kgf/cm^2}	11.8 or more {120 or more}
Material		Chloroprene rubber (Neoprene)



Skate Mat

Features

- Excels in durability against the edge of skate boots.

Applications

- Rubber mat at skate rink

■ Properties : Skate Mat

Properties / Item Name	General Properties			Color
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Standard
TAG 5510	56 (54)	15.1 {154}	780	Light Green
TAG 6510	68 (66)	13.8 {141}	630	Moss Green
TAA 6010	59 (58)	16.1 {164}	660	Blue
TAK 6007	60 (58)	13.2 {135}	630	Dark Brown
TEG 6510	68 (66)	12.2 {124}	620	Green, Weather Resistant
TEA 6510	68 (66)	12.2 {124}	620	Blue, Weather Resistant
TAB 6010	62 (61)	10.3 {105}	450	Black

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Abrasion Resistant Rubber Sheet

Features

- Excels in abrasion resistance compared to natural rubber (NR) or general synthetic rubbers.
- Excels in cushioning resistance.

Applications

- Rubber mat
- Gravel conveying belt

■ Properties : Abrasion Resistant Rubber Sheet

Properties / Item Name		General Properties			Heat-Resistant Aging 70℃ × 72h			Compression Set 70℃ × 24h %	Abrasion Loss cc/1000times
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %		
A/R Sheet -L	<50>	48 (45)	11.7 {120}	640	+ 4	- 10	- 23	18	0.363
	<65>	66 (65)	16.1 {164}	430	+ 4	- 6	- 17	25	0.450
	<70>	70 (68)	9.9 {101}	360	+ 3	- 8	- 17	20	0.997
	<80>	82 (80)	14.6 {149}	440	+ 4	0	- 16	20	0.357
A/R Sheet -M	<65>	67 (66)	22.1 {225}	460	+ 5	- 1	- 13	17	0.130
	<90>	90 (88)	16.0 {163}	220	+ 3	- 8	- 32	19	0.260
A/R Sheet -H	<50>	51 (51)	22.1 {226}	720	+ 1	+ 1	- 2	18	0.059
	<60>	61 (61)	24.8 {253}	580	0	- 8	- 17	16	0.050
	<70>	69 (66)	17.7 {181}	500	0	- 1	- 12	28	0.113
	<80>	84 (82)	18.5 {189}	460	+ 4	- 7	- 35	25	0.150
A/R Sheet -LK	<65>	67 (66)	22.1 {225}	460	+ 5	- 1	- 13	17	0.130
White A/R Sheet	<65>	62 (58)	18.3 {187}	840	+ 5	- 5	- 19	40	0.400

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※ A/R: Abrasion Resistant

※ Abrasion loss shall be measured by Akron Abrasion Tester.

※ The item highlighted in this color is our standard product.

Ti-Hanenon

Features

- Excels in shock absorbency and vibration insulation.
- The impact resilience is 6 ~ 7%. (Measured Value)

Applications

- Damping material: Protection of conveying equipment, stopper for precision positioning of conveyed goods, replacement of shock absorber.
- Floor material: Prevention of scattering and loss of dropped goods.
- Resonance reducing material for audio equipment: Insulation of player unit from external vibrations.
- Various vibration absorbing rubbers and cushioning material (gasket, packing)

■ Properties : Ti-Hanenon

Properties / Item Name		General Properties			Heat-Resistant Aging 100℃ × 72h			Oil Resistance 100℃ × 72h		Ozone Resistance Ozone 50pphm x 40℃ x 20% Elongation x 72h	Impact Resilience %
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %	JIS#1 Volume Change Rate %	JIS#3 Volume Change Rate %		
Ti-Hanenon	<65>	62 (49)	3.6 {38}	840	+ 3	+ 11	- 8	- 3	+ 13	No crack	7
	<35>	35 (25)	6.2 {63}*1	1000 or more*1	+ 10	10.3*2	820*2	- 11	+ 27	C-4	6

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*1 The maximum value was indicated because the test piece was extended more than measurement limit.

*2 Change rate was not able to be calculated because the measurement result of TB and EB could not be obtained. Therefore, each measured value was indicated.

*3 The above mentioned values are not standard values, but measured values.

Specification	Product Dimension (Standard Size)		
	Thickness mm	Width m	Length m
With embossed pattern on both surfaces	2～10t	1	2

※ Please consult us on thickness and surface specification other than the above listed.

Cloth Inserted Rubber Sheet

Features

- Elongation can be suppressed to a small value by inserted cloth making it suited for seal packings of parts with the possibility of dimensional changes such as swelling caused by heat and chemicals.
- Furthermore, the thickness of the rubber between layers is a minimum of 1mm.
- Please confirm before use of these rubbers as rubbers for watertight retention.

※ Penetration leakage might be caused at cloth part depending on the use condition in the case of use for waterproof packing.

■ One to several plies of the cloth of the table below is/are inserted between various rubber sheets in accordance with the specification of customers.

Type	Name	Yarn Count (Warp X Weft)	Thread Count (Warp X Weft per 5cm)	Thickness mm	Tensile Strength kgf/3cm	Elongation %
Cotton	Thick texture 22C	10 / 3 x 10 / 3	45 x 47	0.85	45	25
〃	Thick texture 25C	10 / 2 x 10 / 2	51x 51	0.7	30	20
Tetron	—	30 / 1 x 30 / 1	90 x 88	0.15	32.3	11
Vinylon	—	—	31 x 31	0.5	283	9
Glass-Cloth	—	—	84 x 64	0.18	164	—

Non-Contaminating Rubber Sheet

Features

- Please confirm before use of these rubbers although they do not contaminate metal and plastic much.

Applications

- Seal material for plastic molding

■ Properties : Non-Contaminating Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 70℃ × 72h			Compression Set 70℃ × 24h %	Material
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %		
EPT-S <40>	40 (39)	10.3 {105}	660	+ 1	- 3	- 2	19	EPT
<50>	52 (48)	11.9 {121}	680	+ 3	+ 5	- 8	15	EPT
<60>	60 (56)	11.7 {119}	670	+ 3	+ 7	- 3	17	EPT
<70>	70 (68)	11.5 {117}	480	+ 5	+ 1	- 3	9	EPT
<80>	83 (80)	13.4 {137}	250	+ 2	+ 3	+ 4	10	EPT
<90>	93 (91)	14.6 {149}	220	+ 1	+ 4	0	12	EPT
TCB 607 0P	60 (57)	8.3 {85}	490	+ 17	- 20	- 27	21	CR

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Super Soft Rubber SSR-25

Features

- Extremely excels in flexibility because its hardness is 25degree (Type A).

Applications

- Cushion materials

■ Properties : Super Soft Rubber SSR-25

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃ × 72h			Compression Set 70℃ × 24h %	Material
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %		
SSR-25	25 (17)	6.1 {62}	1230	+ 7	+ 16	- 5	22	SBR

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Flame-Retardant Rubber Sheet

Features

- Rubber sheet of UL specifications which are globally recognized for safety testing in flame retardancy.

Applications

- Barrier enclosure of electronic device
- Insulated cover bush and gasket for charging device
- Packing cushion materials and seal materials for vehicles or ships
- Rubber parts for housing device

■ Properties : Flame-Retardant Rubber Sheet

Properties / Item Name	General Properties			Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	
ULCR-0160	63 (61)	9.5 {97}	550	Passes UL94V-0 Test (CR)
CR-M Flame Retardant <60>	60 (57)	11.5 {117}	470	Passes Flame-Retardant Test for Railway Rolling Stock Materials (CR)
ULSR	55 (55)	7.4 {75}	320	Passes UL94V-0 Test (SR)

※ The item highlighted in this color is our standard product.

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■ Dimension

Thickness mm	Thickness Tolerance mm	Irregularity Range mm	ULCR-0160 Width(m) x Length(m)
1.5	±0.2	0.25	1x10
2	±0.25	0.3	〃
3	±0.3	0.4	〃
4	±0.35	0.5	〃
5	±0.4	0.6	1x5
6	±0.5	0.7	〃
8	±0.7	0.8	〃
10	±0.85	1.0	〃

Ti-Prene UL Product

UL94V-0 Qualified Product

● Ti-Prene is registered in UL with UL94V-0 pass which is the highest flame retardant level in flame test. (UL file No. E60836)
First certified urethane molding product of Flame-Retardant UL in Japan.
Selectable from a thickness (1.0mm or more), sheet, round bar, pipe, and molding.

■ Ti-Prene UL Product Properties

Properties / Item Name	General Properties			Tear Resistance kN/m {kgf/cm}	Color Standard	UL Qualified Range		
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %			Minimum Thickness mm	Combustion Class	Registration File
ULTR100-90	91 (89)	52.3 {534}	440	90.5 {92.3}	Brown	0.80	V-0	E60836

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■ UL94 Registered Rubber Materials (Recognized Component) List

Properties / Item Name	Chloroprene for general molding ULCR-01		For Press Molding Silicone	For Press Molding Silicone	For Press Molding Silicone	Ti-Prene
	#60	#80	TSE2183U	KE5606	KE5612G	ULTR100-90
General Properties						
External color	Black	Black	Dark Gray	Light Gray	Dark Gray	STD Color
Hardness (Type A)	62	81	55	55	55	91
Tensile strength MPa {kgf/cm^2}	9.1 {93}	10.8 {110}	7.0 {7.1}	6.4 {65}	8.3 {85}	46.5 {474}
Elongation (%)	680	370	420	300	310	450
Tear resistance N/mm {kgf/cm}	24.5 {25}	33.3 {34}	2.5 {25}	16.7 {17}	15.7 {16}	79.3 {81}
Heat Resistance						
Normal temperature (℃)	80		200	200	200	—
Maximum use temperature	100		250	250	250	70
Ozone Resistance						
50pphm. 40℃	96h		200h	200h	200h	200h
20% Elongation	No cracks		No cracks	No cracks	No cracks	No cracks
Electrical Insulation						
Resistivity value (Ω·cm)	1.5 x 10^{12}		4 x 10^{15}	1.3 x 10^{15}	1.0 x 10^{16}	3.8 x 10^{13}
UL Qualified Range						
Minimum thickness (mm)	0.305		1.02	0.8	0.2	0.8
Ignition class	V-0		V-0	V-0	V-0	V-0
Hot wire ignition (sec.)	—		300+	300+	—	—
High current arc ignition (time)	—		200+	200+	—	—
Tracking resistant ignition (V)	—		400+	500+	—	—
Registration file No.	E60836		E56745 (R)	E48923	E48923	E60836
Remarks			Application product from Momentive Performance Materials Japan LLC.	Application product from Shin-Etsu Chemical Co., Ltd.	Application product from Shin-Etsu Chemical Co., Ltd.	Standard color is brown

Note) Above data is average measured value and not a shipping standard value.

UL

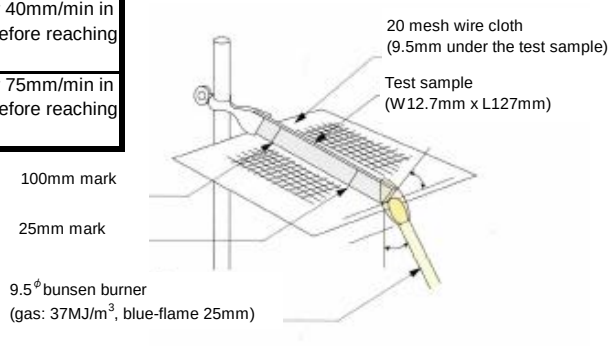
Underwriters Laboratories Inc. (UL), which has over 100 years of history, is the independent test and certification organization established in 1894 in the USA for the purpose of contribution to the public safety.
The main activity is to formulate various product specification, and to provide product test and certification service based on the formulation. This contribute to ensuring safety for the wide variety of products.
Also UL develops safety standard and about 70% of the standard is certified by ANSI (American National Standards Institute) and adopted as national standard in the USA.

UL94

is a standard in flame retardancy for high-polymer material (rubber/plastic). There are two test methods. One is that the test specimen is burned horizontally and the other is that burned vertically.
It is classified depending on a degree of burning. The most flame-retardant class is V-0, the second is V-1, the third is V-2, and HB class is for goods which have slow-burning nature. It is defined in the USA what class of materials should be used for electric home appliances depending on usages of the parts.

■ UL94 Horizontal Burn Test

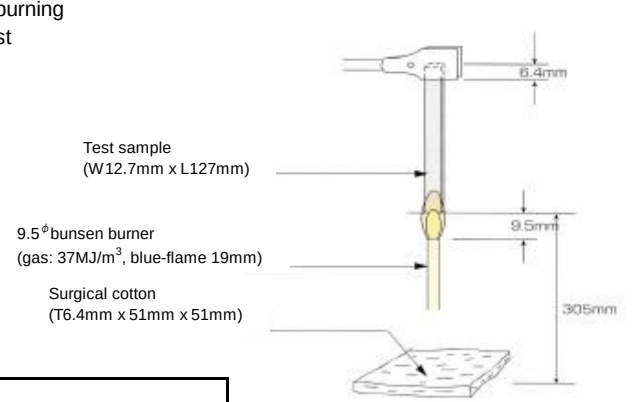
Class	Test Sample Thickness (mm)	Number of Test Sample	Burning Time (sec)	Acceptance Criteria
UL94HB	3.0～13.0	3	30	Burning speed should not over 40mm/min in 75mm section, or burned out before reaching 100mm mark
	Less than 3.0	〃	〃	Burning speed should not over 75mm/min in 75mm section, or burned out before reaching 100mm mark



■ UL94 Vertical Burn Test

Class	Test Sample Thickness (mm)	Number of Test Sample	Burning Time (sec)	Burn out time (sec)Note)			Growing at 2nd test (sec)	Dropping to surgical cotton
				1st Burning	2nd Burning	Total		
UL94V-0	Arbitrarily for 12.7 or less	5	10	Within 10	Within 10	Within 50	Within 30	Shall not ignite at all
UL94V-1	〃	〃	〃	Within 30	Within 30	Within 250	Within 60	Shall not ignite at all
UL94V-2	〃	〃	〃	〃	〃	〃	〃	Shall not ignite much

Note) Ignition for 2nd burning shall be performed as soon as 1st burning is went out. 1st & 2nd burn out time for each 5 pieces of test sample shall be counted up as the total burn out time.



Yellow Card

Yellow card as the following picture is issued for a material which passed UL burn test, and UL certifies the registered matters.

Follow Up

UL inspector irregularly visits a plant four times a year to inspect each process and verifies whether the registered product is produced in accordance with the standard.

Environmental Load Reduction Sheet

Ti-Eco Series

New and eco-friendly rubber sheets without use of designated chemical substances which are recently viewed with suspicion. These sheets also have weather resistance as well as oil resistance.

Features

- Eco-friendly synthetic rubber sheets which have weather resistance as well as oil resistance.
- Phthalate compounds and etc. such as DOP are not used.
- Halogen-containing materials such as chloroprene or PVC are not used.
- Complies with Japanese food hygiene law "Japanese Ministry of Health and Welfare Notification No.85 (Japanese Ministry of Health, Labour and Welfare Notification No.201)" including extraction of acetic acid.
- The related chemical substances designated by Law for PRTR are not used.
- The 6 chemical substances which are banned to use by RoHS were not detected as the result of analysis.

(Notes)

Law for PRTR	Laws concerning comprehension and promotion of improvement in control of release amounts of specific chemical substances in the environment.
RoHS Directive	Restriction of the use of certain hazardous substances in electrical and electronic equipment.

■ Properties : Ti-Eco Sheet

Properties / Item Name	General Properties			Tear Resistance	Color
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	N/mm {kgf/cm}	Standard
Ti-Eco Sheet	70	9.4 {95.9}	600	42.4 {43}	Black
Ti-Eco Sheet White	62	7.9 {80.6}	810	25.0 {26}	White
Ti-Eco Sheet Green	63	7.8 {79.6}	820	27.7 {28}	Green

JIS K 6250

1/1

試 験 報 告 書

平成18年2月1日

No.432-05-A-1980

財団法人 化学物質評価研究機構

1. 依 頼 者　タイガースポリマー株式会社 殿
2. 受 付 日　平成18年2月16日
3. 試　　料　タイエコシート-HP　1点
4. 試験項目及び方法
食品衛生試験：昭和63年厚生省告示第85号による。
但し、使用温度が100℃を超えない試料とする。
5. 試験結果

単位 ppm

項　目	試験結果	判定	基　準
材質試験			
鉛	不検出(10未満)	適合	100以下
カドミウム	不検出(2.5未満)	適合	100以下
溶出試験			
フェノール	不検出(5未満)	適合	5以下
ホルムアルデヒド	溶くない	適合	対照液の呈する色より濃くないこと
蒸発残留物	3.4	適合	15以下
重金属	不検出(1未満)	適合	1以下
蒸発残留物			
水	2	適合	60以下
4%酢酸	13	適合	60以下
20%エチルアルコール	不検出(1未満)	適合	60以下

以 上

(受付No.432-05-1-1951)

大阪事業所 〒543-0033 大阪市天王寺区堂ヶ芝1-6-5 電話 06-6771-5167(代)

Chemical Resistance of Rubber Materials

Chemicals	NR	CR	NBR	EPT	IIR	CSM	SBR	Urethane
アセトアルデヒド　Acetaldehyde	△	×	×	○	◎	△	×	×
アセトン　Acetone	○	△	×	○	◎	○	○	×
アニリン　Aniline	△	×	×	○	○	△	×	×
亜麻仁油 (100℃)　Linseed Oil (100℃)	×	×	◎	△	○	○	×	○
亜硫酸　Sulfurous Acid	○	○	○	○	○	◎	○	×
塩酸（10%、RT）　Hydrochloric Acid (10%, RT)	×	△	○	○	◎	◎	○	△
濃塩酸（36%、RT）　Concentrated Hydrochloric Acid (36%, RT)	×	△	○	○	◎	○	○	△
塩化ベンゼン　Benzene Chloride	×	×	×	×	×	×	×	×
ガソリン　Gasoline	×	△	○	×	×	×	×	○
過酸化水素水（5%、RT）　Hydrogen Peroxide Solution (5%, RT)	◎	○	○	◎	○	◎	○	—
蟻酸（25%、RT）　Formic Acid (25%, RT)	◎	◎	○	◎	◎	◎	◎	×
キシレン　Xylene	×	×	×	×	×	×	×	△
クロム酸（10%、70℃）　Chromic Acid (10%, 70℃)	×	×	×	△	△	○	×	×
クレゾール　Cresol	×	△	△	×	×	△	×	×
酢酸（10%、RT）　Acetic Acid (10%, RT)	○	○	○	○	◎	○	○	×
酢酸エチル　Acetic Ether	×	×	×	○	○	×	×	×
臭素　Bromine	×	×	×	×	△	×	×	×
四塩化炭素　Carbon Tetrachloride	×	×	×	×	△	×	×	△
水酸化アンモニウム　Ammonium Hydroxide	×	○	○	◎	◎	◎	×	◎
水酸化カルシウム　Calcium Hydroxide	◎	◎	◎	◎	◎	◎	◎	◎
水酸化ナトリウム（30%、RT）　Sodium Hydroxide (30%, RT)	○	◎	○	◎	◎	○	○	×
硝酸（10%、RT）　Nitric Acid (10%, RT)	×	○	△	○	◎	○	○	×
濃硝酸（60%、RT）　Concentrated Nitric Acid (60%, RT)	×	×	×	△	△	△	×	×
発煙硝酸（RT）　Fuming Nitric Acid (RT)	×	×	×	×	×	×	×	×
シクロヘキサン　Cyclohexane	×	×	×	○	○	△	×	×
ジブチルフタレート　Dibutyl Phthalate	×	×	×	◎	○	×	×	—
ジエチルエーテル　Diethyl Ether	×	△	○	△	△	○	×	◎
トルエン　Toluene	×	×	×	×	×	×	×	△
トリエタノールアミン　Triethanolamine	○	◎	○	○	◎	◎	○	×
ハイドロキノン　Hydroquinone	○	×	△	—	—	×	—	—
ブタン　Butane	×	○	◎	×	×	○	×	○
プロパン　Propane	×	○	◎	×	×	○	×	△
ベンゼン（ベンゾール）　Benzene (Benzol)	×	×	×	×	×	×	×	×
メチルアルコール　Methyl Alcohol	◎	◎	◎	◎	◎	◎	◎	×
硫酸（10%、RT）　Sulfuric Acid (10%, RT)	△	○	△	○	◎	◎	◎	△
濃硫酸（98%、RT）　Concentrated Sulfuric Acid (98%, RT)	×	×	×	△	○	△	×	×
発煙硫酸（RT）　Fuming Sulfuric Acid (RT)	×	×	×	×	×	×	×	×
燐酸（75%、RT）　Phosphoric Acid	○	○	○	△	—	◎	○	○

◎ :　Little-affected
○ :　Affected in some degree, but afford to be used.
△ :　Unadvisable to use due to certain amount of affection.
× :　Not applicable due to heavy affection.

Above listed data indicates general chemical resistant behavior such as swelling rate and etc.
It does not provide any guarantees against chemical resistance.
Please confirm by appropriate tests considering use conditions before use.

※ RT : Room Temperature

Chemical Resistance of Silicone Rubber

Silicone rubber has excellent resistance against inorganic chemicals such as various acids, base and salts, animal and vegetable oils, polar organic compounds such as alcohol and acetone, and stops at a volume change rate of about 10～15%, but swells 150～200% in nonpolar solvents such as gasoline, benzene, toluene, carbon tetrachloride and fuel oil. There is a tendency of depolymeriazation of the polymer taking place and decomposing in strong acids and strong alkalies.
Under high pressurized steam which exceed 150℃, hydrolysis is caused and rubber properties are significantly degraded.

■ Chemical Resistance

Chemicals	Condition	Evaluation
酸 Acid		
塩酸 Hydrochloric Acid (35%)	25℃	×
蟻酸 Formic Acid	70℃	△
クロム酸 Chromic Acid (10%)	25℃	×
硝酸 Nitric Acid	25℃	×
氷酢酸 Glacial Acetic Acid	25℃	×
硫酸 Sulfuric Acid (50%)	25℃	×
アルカリ Alkali		
アンモニア Ammonia	25℃	○
水酸化ナトリウム Sodium Hydroxide	70℃	×
次亜塩素酸ナトリウム Sodium Hypochlorite	25℃	△
その他の無機薬品 Other Inorganic Chemical		
塩素 Chlorine	25℃	×
臭素 Bromine	25℃	×
水 Water	70℃	○
ケトン・エーテル類 Ketone, Ether		
アセトン Acetone	25℃	○
メチルエチルケトン Methyl Ethyl Ketone	25℃	△
メチルエーテル Methyl Ether	25℃	△
塩素系溶剤 Chlorinated Solvent		
二酸化メチレン Methylene Dioxide	25℃	○
クロロホルム Chloroform	25℃	×
四塩化炭素 Carbon Tetrachloride	25℃	×
トリクロロエチレン Trichloroethylene	25℃	×
トリクロロエタン Trichloroethane	25℃	×
アルコール類 Alcohol		
イソプロピルアルコール Isopropyl Alcohol	25℃	◎
グリセリン Glycerin	70℃	○
ブチルアルコール Butyl Alcohol	25℃	○
エチルアルコール Ethyl Alcohol	25℃	○
メチルアルコール Methyl Alcohol	25℃	◎

Chemicals	Condition	Evaluation
油・油脂類 Oils and Fats		
エチレングリコール Ethylene Glycol	70℃	◎
シリコーンオイル Silicone Oil	70℃	△
綿実油 Cotton Oil	70℃	◎
ASTM No.3 オイル ASTM No.3 Oil	70℃	△
JIS 1号油 JIS No.1 Oil	70℃	○
燃料油 Fuel Oil		
ガソリン Gasoline	25℃	△
重油 Heavy Oil	25℃	○
ディゼル油 Diesel Oil	70℃	×
芳香族系炭化水素 Aromatic Hydrocarbon		
ベンゼン Benzene	25℃	×
トルエン Toluene	25℃	×
キシレン Xylene	25℃	×
フェノール Phenol (10%)	70℃	◎
脂肪族系炭化水素 Aliphatic Hydrocarbon		
n-ヘキサン n-Hexane	25℃	×
シクロヘキサン Cyclohexane	25℃	×
イソオクタン Isooctane	25℃	○

◎ : Little-affected
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Above listed data indicates general chemical resistant behavior such as swelling rate and etc. It does not provide any guarantees against chemical resistance. Please confirm by appropriate tests considering use conditions before use.

Chemical Resistance of Fluoro Rubber

Fluoro rubber has an excellent resistance against wide range of chemicals such as various oil, solvent, acid and etc.
However, it should be cared in the case of use with ketone ester or amine because it can be affected with ease by them.
In addition, it may deteriorate in the case of use with strong alkalies because it has low resistance to them.

■ Chemical Resistance

Chemicals	Condition	Evaluation
酸 Acid		
塩酸 Hydrochloric Acid (35%)	40℃	◎
クロム酸 Chromic Acid (10%)	70℃	◎
硝酸 Nitric Acid (60%)	25℃	◎
氷酢酸 Glacial Acetic Acid	25℃	×
フッ酸 Hydrofluoric Acid (50%)	40℃	○
硫酸 Sulfuric Acid (98%)	40℃	◎
アルカリ Alkali		
アンモニア Ammonia	40℃	○
水酸化ナトリウム Sodium Hydroxide	40℃	※△～○
次亜塩素酸ナトリウム Sodium Hypochlorite	40℃	○
その他の無機薬品 Other Inorganic Chemical		
塩素 Chlorine	25℃	○
臭素 Bromine	25℃	○
水 Water	100℃	◎
ケトン・エーテル類 Ketone, Ether		
アセトン Acetone	40℃	×
メチルエチルケトン Methyl Ethyl Ketone	40℃	×
メチルエーテル Methyl Ether	25℃	×
N-メチル-2-ピロリドン N-Methyl-2-Pyrolidone	25℃	×
塩素系溶剤 Chlorinated Solvent		
塩化メチレン Methylene Chloride	40℃	※×～○
クロロホルム Chloroform	40℃	※△～○
四塩化炭素 Carbon Tetrachloride	40℃	◎
トリクロロエチレン Trichloroethylene	40℃	◎
トリクロロエタン Trichloroethane	40℃	○～◎
アルコール類 Alcohol		
イソプロピルアルコール Isopropyl Alcohol	25℃	◎
エチルアルコール Ethyl Alcohol	25℃	○
グリセリン Glycerin	70℃	◎
ブチルアルコール Butyl Alcohol	40℃	○
メチルアルコール Methyl Alcohol	40℃	※△～○

Chemicals	Condition	Evaluation
油・油脂類 Oils and Fats		
エチレングリコール Ethylene Glycol	70℃	◎
シリコーンオイル Silicone Oil	175℃	◎
綿実油 Cotton Oil	175℃	◎
ASTM No.3 オイル ASTM No.3 Oil	175℃	◎
JIS 1号油 JIS No.1 Oil	175℃	◎
燃料油 Fuel Oil		
ガソリン Gasoline	40℃	◎
灯油 Heating Oil	40℃	◎
Fuel A	40℃	◎
芳香族系炭化水素 Aromatic Hydrocarbon		
ベンゼン Benzene	40℃	※△～◎
トルエン Toluene	40℃	※△～◎
キシレン Xylene	40℃	※○～◎
フェノール Phenol (10%)	70℃	◎
脂肪族系炭化水素 Aliphatic Hydrocarbon		
n-ヘキサン n-Hexane	25℃	○
シクロヘキサン Cyclohexane	25℃	○
イソオクタン Isooctane	25℃	○

◎ : Little-affected
○ : Affected in some degree, but afford to be used.
△ : Unadvisable to use due to certain amount of affection.
× : Not applicable due to heavy affection.

Above listed data indicates general chemical resistant behavior such as swelling rate and etc. It does not provide any guarantees against chemical resistance. Please confirm by appropriate tests considering use conditions before use.

Comparison Table on Chemical Resistance of Urethane Rubber and the Other Materials

Chemicals		Ti-Prene	NR	EPT	NBR	CR	Nylon
Oils and Fats	Gear Oil, type 1, No. 1	◎	×	×	○	○	—
	Hydraulic Oil	◎	×	×	◎	○	—
	Silicone Oil	○	○	◎	○	○	○
Fuel Oil	Gasoline	○	×	×	○	△	◎
	A type Oil No. 1	○	×	×	○	×	—
	Gas Oil No. 1	◎	×	×	◎	△	—
Acid	Hydrochloric Acid (10%)	△	×	○	△	△	×
	Nitric Acid (10%)	×	×	○	△	○	×
	Sulfuric Acid (30%)	△	△	○	△	○	×
	Phenol (10%)	×	△	○	×	△	×
Alkali	Sodium Hypochlorite	×	△	○	○	○	×
	Sodium Hydroxide	○	◎	◎	○	◎	○
Ketone, Ether	Acetone	×	○	○	×	△	◎
	Methyl Ethyl Ketone	×	×	△	×	△	◎
Chlorinated Solvent	Trichloroethylene	×	×	×	△	×	○
	Methylene Chloride	×	×	×	×	×	—
	Carbon Tetrachloride	△	×	×	△	×	◎
Aromatic Hydrocarbon	DBP	○	△	○	×	×	—
	Xylene	△	×	×	×	×	◎
	Cresol	×	△	○	×	△	—
	Toluene	△	×	×	×	×	◎
	Benzene	×	×	×	×	×	○
Alcohol	Ethyl Alcohol	○	◎	◎	○	◎	—
	Ethylene Glycol	○	◎	◎	◎	◎	◎
	Glycerin	◎	◎	◎	◎	◎	◎

◎ : Little-affected

○ : Affected in some degree, but afford to be used.

△ : Unadvisable to use due to certain amount of affection.

× : Not applicable due to heavy affection.

Above listed data indicates general chemical resistant behavior such as swelling rate and etc. It does not provide any guarantees against chemical resistance. Please confirm by appropriate tests considering use conditions before use.

Relation between Load and Strain of Rubber Material

1. Relational expression between load (W) and apparent Young's Modulus

$W = Eap \times A_L \times A(\varepsilon)$

W	:	Load	(kgf)
Eap	:	Apparent Young's modulus	(kgf/cm^2)
A_L	:	Area of load	(cm^2)
A (ε)	:	Modulus	

2. Apparent Young's Modulus (Eap)

Cylinder $Eap = Gs(3+4.935S^2)$
Quadratic prism $Eap = Gs(3+6.58S^2)$
Infinite quadratic prism $Eap = Gs(4+3.29S^2)$

※ Infinite quadratic prism : Defined to a case the formula is carried by "a>3b" with quadratic prism (a>b).

Gs	:	Elastic Modulus in Static Shear (kgf/cm^2), or (kgf/cm^2)
S	:	Shape factor

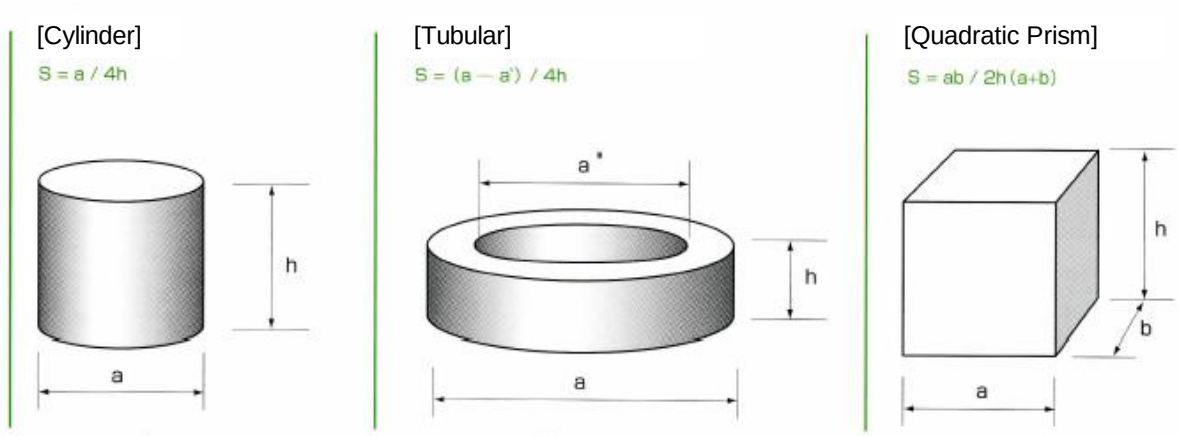
3. Shape Factor

S = Area of load (A_L) / Free area (A_F)

※ Area : m^2 or cm^2

(Note) Area of load (A_L) : Total area where receives load.
For the following figures, it shall be the one side's area of upper and lower side.

Free area (A_F) : Total area where deformable under load.
For the following figures, it shall be the area other than total area of upper side and lower side, which means the total area of lateral side(s).



[Calculation Example]

Calculate a strain amount of frame gasket tightened by 1000kgf.
The frame gasket is made by NBR (L)<Hs70> shown in Figure 1.

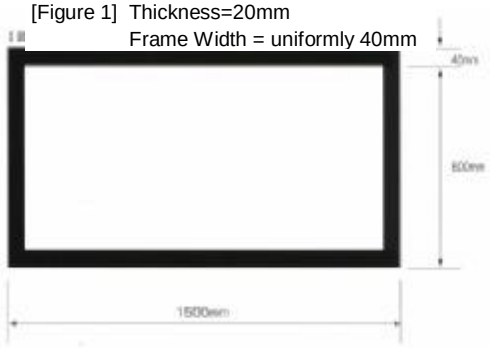
<Calculation Condition> :

Tightening force shall be equal at every locations on a gasket.

Elastic Modulus in Static Shear of NBR (L) <Hs70> shall be 1.3Mpa (Quoted from Catalog)

Elastic Modulus in Static Shear listed in this catalog is not a measured value, but calculated value.

[Figure 1] Thickness=20mm
Frame Width = uniformly 40mm



Step 1 Calculate the shape factor of frame gasket.
In this case, calculate it according to shape factor formula.

$$S = \text{Area of load / Free area}$$
$$= \frac{(150 \times 84) - (142 \times 76)}{2 \times 2 \times (150+84+142+76)}$$
$$= \mathbf{1.0}$$

Step 2 Calculate the apparent Young's modulus as infinite quadratic prism in this case.

$$Eap = Gs\,(4+3.29S^2)$$
$$= 13.1 \times (4+3.29 \times (\mathbf{1.0})^2)$$
$$= \mathbf{95.5}\ (kgf/cm^2)$$

Step 3 Calculate the gasket strain: ε by relational expression between load (W) and apparent Young's Modulus.

$W = Eap \times A_L \times A\,(\varepsilon)$ W (Load) = 1000kgf

A_L (Area of load) = (150×84) - (142×72) ≒ 2376cm2

$1000\ (kgf) = \mathbf{95.5}\ (kgf/cm^2) \times \mathbf{1808}\ (cm^2) \times A\,(\varepsilon)$

$A\,(\varepsilon) \fallingdotseq \mathbf{0.0058}$

Read out from Table 1.

ε <0.5% So the strain is 20 (mm) × 0.005=0.1 (mm)

Result The above frame gasket strains appox. 0.1mm or less.

From this catalog, you can recognize that the following rubber materials have required property in elastic modulus in static shear.

- CR Rubber Sheet : Rubber sheet material harder than CR (L) <Hs65>
- NBR Sheet : Rubber sheet material harder than NBR (L) <Hs70>
- EPDM Sheet : Rubber sheet material harder than EPT (M) <Hs65>
- Natural Rubber Sheet : Black rubber sheet <Hs65> and etc.

Rubber sheet shall be selected from the above listed sheets in consideration of the use environment or required properties such as oil resistance, ozone resistance and etc.

Table 1. Chart of relation between strain: ε and modulus: $A\,(\varepsilon)$ Relational expression : $A\,(\varepsilon) = 1/3\,[(1+\varepsilon) - (1+\varepsilon)^{-2}]$

Strain : ε %	$A\,(\varepsilon)$
0	0.000000
0.5	0.005050
1	0.010101
3	0.030937
5	0.052678
10	0.111520
15	0.178030
20	0.254170

Note)
These are just calculated values on strain.
They might be different in some degree depending on environment, temperature and etc. from actually measured value.

Standard of Rubber Packing Material JIS K 6380 (Excerpt from the standard)

1. Scope of Application

This standard prescribes classification based on a quality of vulcanized rubber material (hereinafter referred to as "rubber material") used as rubber products including rubber packing material.

2. Classification

In order to organize the classification, rubber materials shall be classified by use of the following 3 alphabetical capital letters. The first letter shows heat resistance, the second oil resistance, and the third cold resistance.
For example, if a rubber material code is BCD, it is the rubber material of which heat resistance is "B", oil resistance is "C" and cold resistance is "D".

3. Expression Method of Classification

3-1. Heat, Oil, and Cold Resistance

a) Heat Resistance
Heat resistance shall be measured after being aged with heat in an oven for 70 hours and described by maximum temperature at which change ratio of tensile strength does not exceed ±30%, change ratio of elongation at break does not exceed -50% and change of IRHD or Type A Durometer hardness does not exceed ±15. Test temperatures to be determined heat resistance of rubber materials are shown in the following Table 1.

Table 1 Classification of Heat Resistance

Heat Resistance	Test Temperature ℃ (1)
A	70
B	100
C	125
D	150
E	175
F	200
G	225
H	250
J	275
K	300

Note (1) Test temperatures shall be those specified in JIS K 6257. Rubber materials can not endure the above indicated temperatures for every special usage because heat aging test in laboratory is just an accelerated test.

b) Oil Resistance Oil resistance shall be classified as following Table 2 by calculating modulus of volume change by the method specified in JIS K 625. In this case, #3 lubricant oil is used, and test specimen is continuously immersed in the oil for 70 hours. However, stability limit of the oil is 150℃. The rubber materials of which test temperatures listed in the Table 1 are more than 150℃ shall be tested at 150℃.

Table 2 Classification of Oil Resistance

Oil Resistance	Modulus of Volume Change (Max) %
A	Over 140 (or no definition)
B	140
C	120
D	100
E	80
F	60
G	40
H	30
J	20
K	10
L	5

c) Cold Resistance Cold resistance shall be based on brittle temperatures of rubber materials measured by the method specified in JIS K 6261. Each impact brittle temperature against cold resistance is shown in the following Table 3.

Table 3 Classification of Cold Resistance

Cold Resistance	Impact Brittle Temperature (Max) ℃
A	0
B	-10
C	-25
D	-40
E	-55
F	-75
G	-85
H	No definition

3-2. Basic Performance

a) Basic Performance and Classification for Indication

Basic performance shall be defined and indicated with 4 indication digits as follows. (An appropriate unit shall be indicated in parenthesis.)

1) 1st digit shows hardness (IRHD or Type A Durometer)
2) 2nd digit shows a minimum value of tensile strength (MPa)
3) 3rd digit shows a minimum value of elongation at break (%)
4) 4th digit shows a maximum value of compression set (%) at temperature defined for heat resistance.

As there are 2 test methods for hardness, the indication as (IRHD) shall be added at the end only in the case that IRHD is used.

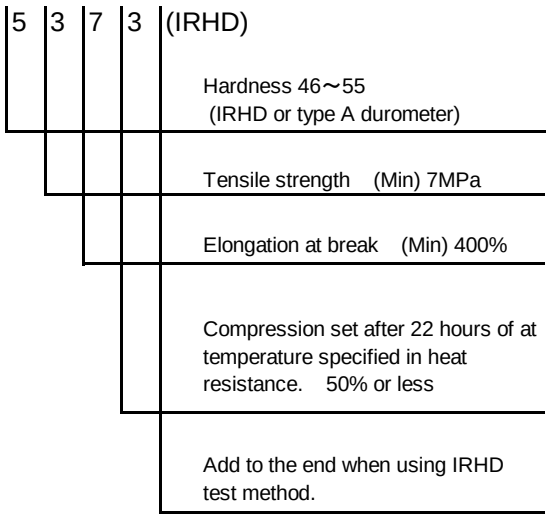
Indication digits for basic performance are shown in the following Table 4.

Table 4 Classification of Indication Digits

Indication Digit	Hardness		Tensile Strength	Elongation at Break	Compression Set (2)
	IRHD	Type A Durometer	(Min) MPa	(Min) %	(Max) %
0	None	None	None	None	None
1	10-15	10-15	3	50	80
2	16-25	16-25	5	100	60
3	26-35	26-35	7	150	50
4	36-45	36-45	10	200	40
5	46-55	46-55	14	250	30
6	56-65	56-65	17	300	25
7	66-75	66-75	20	400	20
8	76-85	76-85	25	500	10
9	86-95	86-95	35	600	5
Test Method JIS K 6253			Test Method JIS K 6251	Test Method JIS K 6251	Test Method JIS K 6262

Note (2) As a test condition of compression set, it shall be measured in 22 hours after being heated at temperature defined for heat resistance.

b) Example of Indication Digits for Basic Performance



3-3. Special Performance

Additional code(s) and digit(s) shall be used in order to express special performance(s) in the case that basic performance is partially changed or another performance is added.

Remark 1

Only performance(s) to make rubber materials meet required conditions of specification shall be added as special performance(s).

Remark 2

Basic performance shall be effective unless otherwise defined additionally by special performance.

a) Additional Code

Addition code(s) shall be used to express tested characteristics, and be listed in the following Table 5. In the case that an additional code is E, 2 letters are to be used.

Table 5 Classification of Additional Code for Special Performance

Additional Code	Special Performance
A	Heat Resistance
B	Compression set, tension set
C	Ozone resistance (static and dynamic)
D	Compressive stress relaxation
E (3)	Liquid resistance
EO	Oil resistance (Lubricant oil)
EF	Oil resistance (Fuel oil)
EA	Water resistance
F	Cold resistance
G	Tear resistance
H	Flex resistance
J	Abrasion resistance
K	Adhesion properties
L	Gas permeability
N (4)	Chemical resistance
O	Electrical properties
P	Staining properties, contact properties
R	Impact resilience
S	Dynamic properties
T	Static tensile properties
U	Leachability
(V,W,X,Y)	(Spare codes for novel properties)
Z	Others

Note(3) Addition sign "E" includes a test of liquid which causes physical change by swelling.

Note(4) Addition sign "N" includes a test of liquid which causes both physical change and chemical change by swelling.

JIS K 6353 Standard of Rubber Material for Waterworks

Table 1 Quality (Properties)

Type		Durometer Hardness H_A (Type A)	Tolerance of Durometer Hardness	Tensile Test: Elongation % under load 7.0MPa {71.4kgf/cm²} (or less)	Tensile Test: Tensile Strength MPa {kgf/cm²} (or more)	Tensile Test: Elongation % (or more)	Aging Test: Change Ratio of Tensile Strength % (or less)	Aging Test: Change Ratio of Elongation % (or less)	Aging Test: Change of Durometer Hardness H_A	Compression Set % (or less)	Application (Ref.)
Class I (3)	A	70	±5	200	18(2) {184}	300	-20	+10 -20	+7 0	20	Rubber ring used at pipe joint [Cast iron pipe, steel pipe, rigid PVC pipe, prestressed concrete pipe (pressure tube)] Rubber for butterfly valve seat
		65	±5	250	18(2) {184}	400	-20	+10 -30	+7 0	20	
		60	±5	300	18(2) {184}	400	-20	+10 -30	+7 0	20	
		55	±5	350	18(2) {184}	400	-20	+10 -30	+7 0	20	
		50	±5	400	18(2) {184}	400	-20	+10 -30	+7 0	20	
	B	65	±5	-	18(2) {184}	450	-40(1)	+10(1) -40	+5(1) 0	20	Valve part of rubber ring for push-on joint of cast iron pipe
		50	±5	-	18(2) {184}	450	-40(1)	+10(1) -40	+5(1) 0	20	
Class II		70	±5	200	16(2) {163}	300	-20	+10 -30	+7 0	30	Rubber used for grand part of sluice valve and rubber used for butterfly valve seat
		65	±5	250	16(2) {163}	300	-20	+10 -30	+7 0	30	
		60	±5	300	16(2) {163}	300	-20	+10 -30	+7 0	30	
		55	±5	350	16(2) {163}	300	-20	+10 -30	+7 0	30	
		50	±5	400	16(2) {163}	300	-20	+10 -30	+7 0	30	
Class III		80	±5	-	12 {122}	280	-25(4)	+10(4) -30	+5(1) 0	30(4)	Plated rubber used on flange surface, conical rubber used in air valve, and round shape plated rubber. Heel part of rubber ring for push-on joint of cast iron pipe
		75	±5	-	12 {122}	300	-25	+10(4) -30	+7(4) 0	30(4)	
		65	±5	250	12 {122}	300	-25	+10 -30	+7 0	30	
		60	±5	300	12 {122}	300	-25	+10(2) -30	+7(4) 0	30(4)	
Class IV		50	±5	-	9 {91.8}	400	-25	+10 -30	+7 0	30	Rubber ring for concrete pipe

Table 2 Quality (Leachability)

Test Item		Quality		
Rubber Type		SBR	NBR	EPDM
Common Item	Turbidity ※	0.5 degree or less	0.5 degree or less	0.5 degree or less
	Chromaticity ※	1 degree or less	1 degree or less	1 degree or less
	Potassium permanganate consumption	2mg/l or less	2mg/l or less	2mg/l or less
	Reduced amount of chlorine	0.7mg/l or less	0.7mg/l or less	0.7mg/l or less
	Odor	Be normal	Be normal	Be normal
	Taste	Be normal	Be normal	Be normal
Selectable Item	Zinc	1.0mg/l or less	1.0mg/l or less	1.0mg/l or less
	Phenols	-	0.005mg/l or less as phenol	

Note ※
Values of turbidity, chromaticity, potassium permanganate consumption and reduced amount of chlorine residual shall be got by difference from those measured by blank test.

Note (1) These values were measured in accordance with JIS K 6257, 7 (pressurized oxygen heat aging test).

Note (2) Tensile strength of ethylene-propylene rubber (EPDM) is 14 MPa {143kgf/cm^2} or more for class I, and 12MPa {122kgf/cm^2} or more for class II.

Note (3) Tensile strength of acrylonitrile butadiene rubber (NBR) and Chloroprene rubber (CR) of class I shall be 16 MPa {163kgf/cm^2} or more.

Note (4) These tests can be partly skipped depending on the applications by mutual consultation between seller and buyer.

Remarks Rubber materials which are used for water works products shall be determined according to JIS standard for waterworks or by mutual consultation between seller and buyer.

■ Type Rubber materials are classified depending on quality to Class I-A, Class I-B, Class II, Class III, and Class IV as listed above.

■ Quality
a) Appearance of rubber materials should be uniform texture and the surface should be smooth. No grossly-visible breakage, crack, bubble, porosity, contamination and other harmful defects in use allowed.
b) Rubber properties are shown in Table 1.
c) Rubber leachability is shown in Table 2.