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).
  When using for medical / medical applications or other applications that require consideration of safety, please test the safety in advance at your company and use it after confirming it.
  Please note that our company does not guarantee the adaptability or safety associated with those applications.
- 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

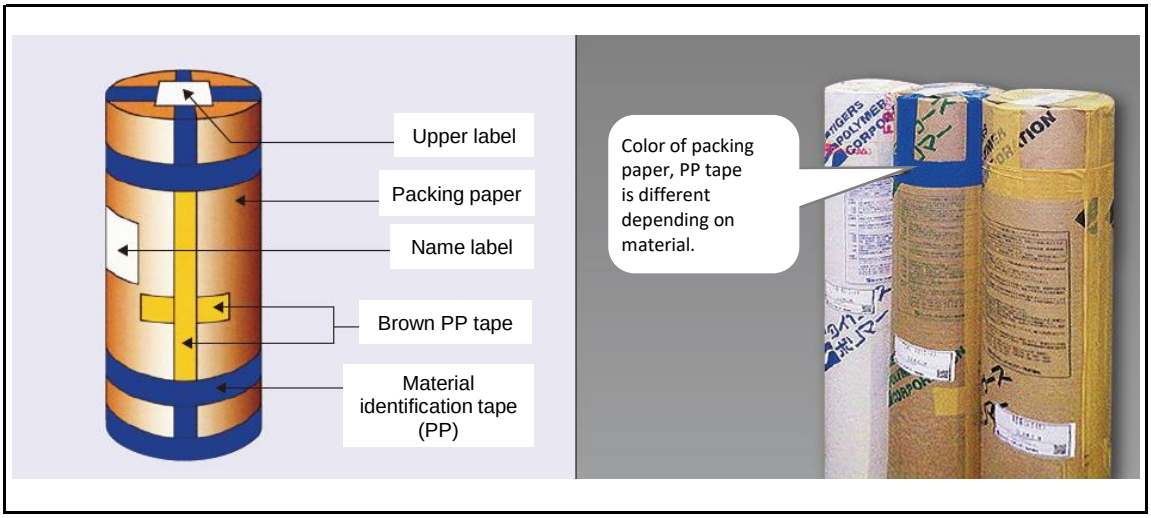
Caution	These products are not suited for medical appliance and for food machinery.
Caution	These products are not suited for applications that come in direct contact with the human body for a long time.
Caution	The life and safety of these products are greatly affected by the application, condition 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

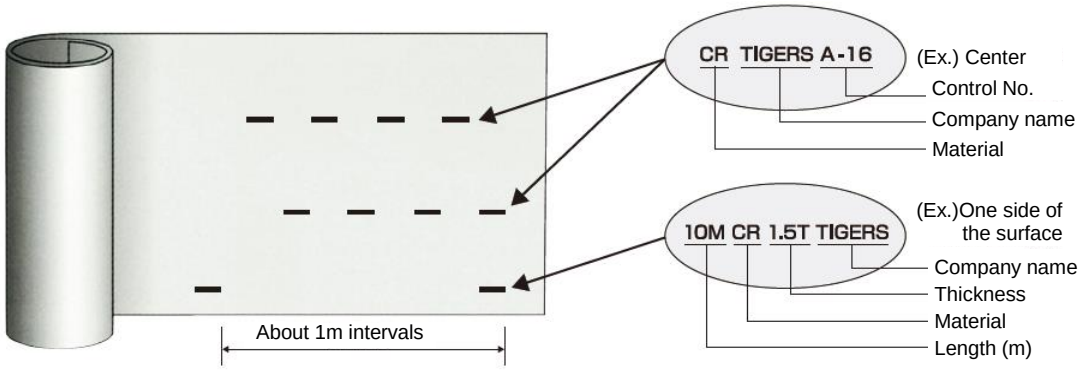
Warning	There are cases of noxious gases being produced when scrap material at time of use or member pieces after use are burned. It is recommended to strictly observe legal disposal methods of industrial waste at time of disposal.

Contents

■External Specification of Rubber Sheet Packing



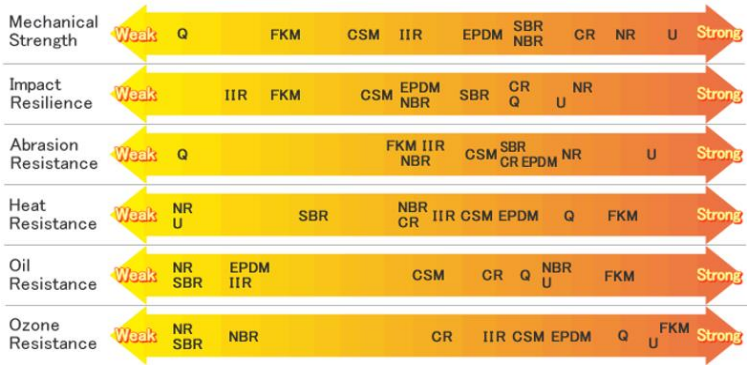
Length (m), material, thickness, and company name are printed on one side of rubber sheet surface at 1 meter intervals. (The distance (1m) between the indications should be regarded as rough length. Rubber sheets should be cut after measurement of actual length. Not printed on Silicone rubber, Fluoro rubber and Urethane sheet)
Material, company name, and control No. are printed on around middle part of Black normal sheet, NBR-L<70>, CR-L<65>, EPT-L<70> and EPT-M<65>.



■External Specification List of Rubber Sheet Packing

Material	Item name	PP Tape Color / Printed Color of Character for Material Identification	Packing Paper Color / Printed Color of Character
Natural Rubber	NR	Brown base / No character printed	Brown base / Black character
Chloroprene Rubber	CR	White base / No character printed	Brown base / Green character
Acrylonitrilebutadiene Rubber	NBR	Yellow base / No character printed	Brown base / Green character
Ethylene-Propylene Rubber	EPT	Blue base / No character printed	Brown base / Green character
Isobutylene Isoprene Rubber	IIR	White base / Green character	Brown base / Green character
Chloro-Sulfonated polyeth	CSM	Brown base / No character printed	Brown base / Green character
Styrene-Butadiene Rubber	SBR	Brown base / No character printed	Brown base / Green character
Silicone Rubber	SR	Transparent base / No character printed	White base / Dark blue character
Fluoro Rubber	FR	Transparent base / Pale pink character	White base / Dark blue character
Urethane Rubber	—	Craft tape / No character printed	Brown base / Green character

■Order of Merit in Properties for Various Rubbers



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

Q: Silicone Rubber

FKM: Fluoro Rubber

EPDM: Etylene Propylen Rubber

U: Urethane Rubber

(Above Ranking table is ASTM notation.)

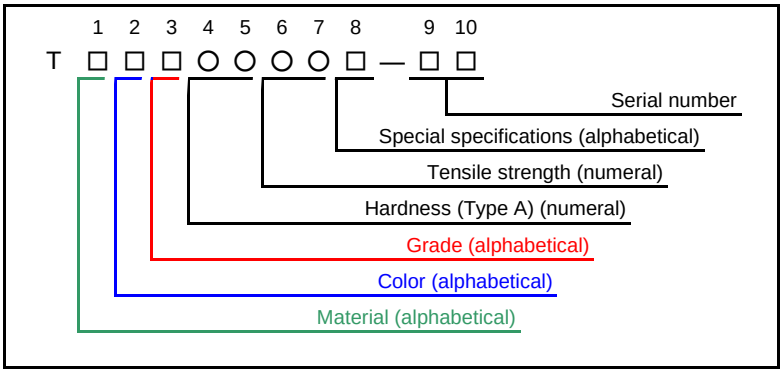
■Commodity Number of Rubber Sheet

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		
alphabetical	A	Natural rubber
	N	NBR
	C	CR
	E	EPT
	H	CSM
	I	IIR
	S	SBR

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

3 shows grade		
alphabetical	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 …… show Special Specifications

An alphabetical character is entered when there is a special specification.
Not entered when there is not any special specification.

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

ii) Functional (property) Special Specifications			
alphabetical A	Heat aging resistance test	alphabetical K	Adhesion test
B	Compression set resistance test	L	Water absorption test
D	Compression strength test	M	Flame resistance test
E	Oil resistance test	O	Ozone resistance test
F	Low temperature test	P	Contamination test
G	Tear test	R	Electrical resistance test
H	Flexing test	S	Resilience test
J	Abrasion 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	1.20	+1.00 −0.50	1.20	+1.00 −0.50	1.00
Less than 25.00	+1.50 −0.50	1.50	+1.50 −0.50	1.50	+1.50 −0.50	1.50
Less than 30.00	+2.00 −0.50	2.00	+2.00 −0.50	2.00	+2.00 −0.50	2.00
Less than 50.00	+2.50 −0.50	2.50	+2.50 −0.50	2.50	+2.50 −0.50	2.50
Less than 70.00	+2.50 −0.50	3.00	+2.50 −0.50	3.00	+2.50 −0.50	2.50
Less than 130.00	+3.50 −0.50	3.50	+3.50 −0.50	3.50	—	—

Unit: mm

■Manufacturable Dimension of Rubber Sheet

(Separately indicated about urethane rubber sheet & sponge sheet)

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

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

■Explanation of Codes

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.

Environmental Adaptation

Worldwide efforts to reduce the use of substances of concern move ahead in considering the life's diversity.
The substances of concern are specified in laws, industry groups and the green procurement standard of each company in Japan too.
Our company doesn't use RoHS(RoHS 2) 10 substances in our products purposely in grasping raw materials of rubber sheets.
Our company will respond to amendments flexibly, in watching the laws, industrial groups and green procurement guideline of companies.

Features

- Conform to the RoHS Directive and ELV Directive(*1)
  - Our company doesn't use the substances specified in RoHS Directive and ELV Directive purposely as raw materials of rubber sheets.
  - Our company will submit you an evidence report of the fluorescent X-ray analysis depending on your needs.

■Analyzed Product List (Excerpt as examples)

Natrual Rubber Sheet	
Black Normal Sheet	〈65〉
Black Rubber Sheet	〈50〉
White Normal Sheet	〈65〉
Green Normal Sheet	〈70〉
Amber Rubber Sheet(40%)	〈50〉
Amber Rubber Sheet(60%)	〈45〉

Synthetic Rubber Sheet			
CR Sheet-L	〈45〉	EPT Sheet-M	〈65〉
	〈65〉	White EPT Sheet-M	〈65〉
	〈90〉	Butyl Sheet	〈65〉
NBR Sheet-L	〈70〉	Black CSM Sheet	〈70〉
	〈90〉	SBR Sheet	〈65〉
EPT Sheet-L	〈70〉		

Special Rubber Sheet
SR-50
SR-70
SPO-35R1
TFB8010
FR Sheet<HS80>
FR Sponge Sheet

Urethane Rubber
TR100-90
TR100-70
TR100-60
TR100-50
TR200-90

For products other than the above, please consult us.

● About other laws and regulations

REACH Regulation(*2) went into effect in June 2007 in Europe. It is examined to add new substances of concern to existing RoHS Directive and ELV Directive. Countries promote the strengthening of laws and regulations, so regulated substances are assumed to increase in the future. Therefore, Industry associations and each company have implemented the development and the update of the Green Procurement Standards.
Heretofore our company reduces and monitors chemical substances which are expected to be regulated, grasping the details of raw material of rubber sheet. For some general –purpose products, our company doesn't use purposely the following chemical substances which are expected to be regulated in the future.

・PCB：Polychlorobiphenyl	・Asbestos
・PFOA：Perfluorooctanoic acid and its salts	・HBCD：Hexabromocyclododecane
・PFOS：Perfluorooctane sulfonates	・Deca-BDE：Decabromodiphenyl ether

For substances of very high concern (SVHC) under the REACH regulation, substances are added approximately once every six months.

Please consult us as it is necessary to investigate whether it is compatible or not with each update.

*1 RoHS Directive：Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.
(RoHS2) (Restriction of the Use of Certain Hazardous Substances in Electrical and Electric Equipment)
ELV Directive: End of Life Vehicles

RoHS Directive Regulated Substances	Threshold Value（*3）（1,000ppm＝0.10%）
Plumbum	1,000ppm
Hydrargyrum	1,00ppm
Cadmium	1,000ppm
Hexavalent chromium	1,000ppm
PBB（Polybromobiphenyl）	1,000ppm
PBDE（Polybromodiphenyl ether）	1,000ppm
DEHP（Diethylhexyl phthalate）	1,000ppm
BBP（Benzyl butyl phthalate）	1,000ppm
DBP（Dibutyl phthalate）	1,000ppm
DIBP（Diisobutyl Phthalate）	1,000ppm

*2 REACH Regulation
: Registration, Evaluation, Authorisation and Restriction of Chemicals.

*3 Threshold Value
: the value of level at which something starts to have an effect.

NR Sheet

Natural Rubber Sheet

Features

- Excels in workability.

Applications

- General packing, gasket material.
- Rubber mat.

■ Properties : Black Normal Sheet

Item Name \ Properties	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	AAH65133	TAKL6503

Features

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

Applications

- General packing, gasket material.
- Rubber mat.

■ Properties : Black Rubber Sheet

Item Name \ Properties	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 Rubber Sheet <40>	43 (43)	8.2 {83.6}	610	+ 6	+ 18	+ 2	18		AAH40373	TAKM4007
<50>	48 (48)	8.9 {90.8}	600	+ 4	+ 2	- 7	19	0.82	AAH50373	TAKM5007
<60>	60 (60)	8.2 {84}	410	+ 7	+ 19	- 12	23		AAH60363	TAKL6007
<70>	73 (72)	17.5 {179}	430	+ 4	- 2	- 25	15		AAH70453	TAKM7010
<80>	80 (75)	9.7 {99}	270	+ 5	- 2	- 13	20		AAH80323	TAKL8007
<90>	92 (89)	10.4 {106}	300	+ 2	+ 6	- 30	28		AAH90323	TAKL9005

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■ Properties : Color Rubber Sheet

Item Name \ Properties	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 <65>	63 (62)	5.4 {55}	480	+ 2	0	- 5	34	1.03	AAH65143	TAWL6504
<85>	85 (81)	5.0 {51}	430	+ 5	- 20	- 22	50		AAH85142	TAWL8504
Red Normal Sheet <65>	63 (62)	8.1 {83}	640	+ 5	+ 2	- 10	30		AAH65253	TARL6504
Green Rubber Sheet <70>	68 (68)	8.7 {89}	570	+ 4	- 5	- 5	29	1.29	AAH70233	TAML7005
Gray Normal Sheet <65>	68 (68)	6.8 {69}	530	+ 1	- 1	- 8	43		AAH65133	TAHL6504

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■ Properties : Amber Rubber Sheet

Item Name \ Properties	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	AAH50373	TAAL5007
(60%) <45>	47 (47)	19.1 {195}	680	+ 2	- 6	- 5	19	AAH45573	TAAH4512

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

⚠
- 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 beforehand 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

NBR Sheet

Acrylonitrile Butadiene Rubber Sheet

Features

- Excels in oil resistance.

Applications

- Packing material for fuel.

■ Properties : Black NBR Sheet

Item Name \ Properties		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 %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903				
NBR Sheet -L	<50>	51 (50)	8.1 {83}	550	+ 11	+ 3	- 34	- 8	+ 34	62		BEH50361	TNKL5005
	<60>	60 (59)	9.4 {96}	560	+ 11	- 15	- 44	- 7	+ 32	75		BEH60351	TNKL6005
	<70>	70 (67)	12.2 {124}	550	+ 6	+ 2	- 43	- 13	0	67	1.15	BFH70341	TNKL7007
	<80>	82 (77)	8.4 {86}	420	+ 6	+ 12	- 35	- 7	+ 15	55		BFH80121	TNKL8005
	<90>	90 (87)	8.6 {88}	360	+ 3	+ 18	- 6	- 4	+ 5	55	1.48	BFH90321	TNKL9007
NBR Sheet -M	<30>	33 (27)	10.8 {110}	1030	+ 5	- 9	- 16	- 14	+ 15	44		BEH30371	TNKM3007
	<40>	41 (37)	12.7 {129}	800	+ 5	- 40	- 20	- 15	+ 10	55		BFH40471	TNKM4010
	<50>	53 (48)	12.2 {124}	710	+ 6	+ 4	- 43	- 19	+ 1	73		BFH50471	TNKM5010
	<60>	61 (58)	10.8 {110}	570	+ 7	- 5	- 30	- 9	+ 8	55		BFH60461	TNKM6010
NBR Sheet -H	<50>	52 (51)	14.6 {149}	610	+ 8	- 15	- 29	- 8	+ 21	27		BEH50471	TNKH5012
	<60>	60 (56)	11.3 {115}	430	+ 6	0	- 25	- 10	- 2	52		BGH60461	TNKH6010
	<70>	71 (70)	16.1 {164}	410	+ 7	- 5	- 34	- 6	+ 4	31		BGH70451	TNKH7012
	<90>	90 (84)	17.8 {182}	280	+ 5	+ 6	- 39	- 5	+ 9	56		BGH90421	TNKH9015
Transformer NBR	<70>	70 (65)	17.9 {183}	470	+ 4	+ 4	- 20	- 19	+ 15	20		BGH70551	TNKH7015

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■ Properties : Colored NBR Sheet

Item Name \ Properties		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 %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903				
White NBR Sheet -L	<50>	50 (47)	11.1 {113}	690	+ 2	- 27	- 21	- 4	+ 31	30		BEH50360	TNWL5005
	<65>	65 (63)	8.9 {91}	710	+ 2	- 23	- 17	+ 3	+ 36	25	0.84	BEH65350	TNWL6507

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■ Properties : Weather Resistant NBR Sheet

Item Name \ Properties	General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 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 %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903			
TNB6007-O	59 (56)	9.6 {98}	510	+ 4	+ 3	- 21	- 10	+ 9	45	BFH60331	TNKM6007-O
TNB9007-O	90 (81)	9.9 {101}	400	+ 3	+ 16	- 35	- 2	+ 17	59	BFH90321	TNKM9007-O

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■ Properties : Gasoline Resistant Rubbeer Sheet

Item Name \ Properties		General Properties			Heat-Resistant Aging 100℃×72h			Oil Resistance 25℃×72h Volume Change Rate % ASTM #1	Oil Resistance 100℃×72h Volume Change Rate % IRM 903	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 %					
NBR-G	<70>	73 (71)	18.2 {186}	280	+ 7	- 3	- 40	+ 9	- 2	34	BGH70451	TNKL7010-E

JIS K 6250

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

⚠

- 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 beforehand 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 CR 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/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903				
CR Sheet -L	<30>	30 (29)	7.5 {76}	670	+ 14	+ 19	- 24	+ 4	+ 133	21		BBH30260	TCKL3005
	<40>	40 (36)	7.9 {81}	540	+ 15	+ 20	- 15	+ 7	+ 125	20		BBH40260	TCKL4005
	<45>	44 (43)	6.6 {67}	440	+ 14	+ 11	- 41	- 2	+ 86	20	0.52	BCH45160	TCKL4505
	<50>	50 (49)	7.3 {75}	400	+ 15	+ 21	- 23	+ 4	+ 90	16		BCH50260	TCKL5005
	<55>	56 (56)	8.6 {88}	360	+ 14	+ 3	- 28	+ 6	+ 86	16		BCH55260	TCKL5505
	<65>	65 (64)	8.5 {86}	310	+ 8	- 20	- 35	+ 18	+ 86	18	1.14	BCH65350	TCKL6507
	<70>	70 (69)	7.2 {74}	280	+ 15	+ 19	- 23	+ 5	+ 44	22		BDH70240	TCKL7005
	<80>	81 (78)	10.8 {110}	390	+ 8	- 3	- 31	+ 18	+ 99	19		BCH80320	TCKL8007
	<90>	91 (88)	10.6 {108}	190	+ 7	+ 18	- 32	+ 1	+ 54	21	1.74	BDH90320	TCKL9007
CR Sheet -M	<50>	49 (49)	13.9 {142}	690	+ 12	+ 5	- 3	- 3	+ 105	21		BCH50460	TCKM5010
	<60>	59 (55)	11.5 {117}	440	+ 12	- 2	- 34	- 4	+ 32	14		BEH60460	TCKM6010
	<70>	72 (72)	10.8 {111}	270	+ 7	+ 4	- 31	- 3	+ 30	19		BEH70450	TCKM7010
	<80>	81 (79)	11.8 {120}	200	+ 6	+ 10	- 32	- 3	+ 33	20		BEH80420	TCKM8010
CR Sheet -H	<50>	47 (44)	14.2 {145}	400	+ 10	- 1	- 22	- 2	+ 85	11		BCH50560	TCKH5014
	<60>	60 (59)	16.1 {164}	570	+ 8	- 12	- 28	+ 3	+ 83	17		BCH60560	TCKH6015

JIS K 6250

■ Properties : Colored CR 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/cm²}	Elongation at Break %	Hardness Change Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903				
White CR-L Sheet	<50>	50 (49)	10.4 {106}	650	+ 11	- 10	- 28	+ 3	+ 86	16		BCH50260	TCWL5005
	<60>	63 (61)	8.0 {82}	630	+ 6	- 27	- 22	+ 20	+ 87	23	0.94	BCH60260	TCWL6006
	<80>	83 (78)	8.1 {83}	390	+ 5	- 8	- 26	+ 22	+ 88	35		BCH80220	TCWL8006
Gray CR-L Sheet	<60>	60 (57)	9.0 {92}	590	+ 9	- 15	- 25	+ 22	+ 104	28		BCH60260	TCHL6006
Green CR-L Sheet	<60>	58 (54)	9.2 {94}	640	+ 3	- 28	- 30	+ 24	+ 114	22		BCH60260	TCML6005

JIS K 6250

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

⚠

・These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immo derately burned.
・The user is requested to confirm degree of discoloration and contamination beforehand 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

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			Heat-Resistant Aging 100℃×72h			Compression Set 70℃×24h %	Ozone Resistance Ozone 50pphm 40℃ 20% Elongation	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 %					
EPT Sheet -L	<40>	43 (43)	16.6 {169}	720	+ 6	- 22	- 16	24	144h No Change		BAH40360	TEKL4007
	<50>	50 (49)	8.4 {86}	580	+ 10	- 5	- 26	23	〃		BAH50360	TEKL5007
	<60>	61 (61)	10.9 {112}	560	+ 8	- 1	- 22	22	〃		BAH60360	TEKL6007
	<65>	64 (62)	8.4 {86}	370	+ 9	- 5	- 47	20	〃		BAH65360	TEKL6507
	<70>	74 (72)	9.7 {99}	480	+ 5	- 4	- 32	24	〃	1.19	BAH70340	TEKL7007
	<80>	81 (79)	12.5 {128}	370	+ 9	- 8	- 32	31	〃		BAH80320	TEKL8010
	<90>	89 (87)	11.9 {122}	430	-	-	-	29	〃		BAH90320	TEKL9007
EPT Sheet -M	<50>	49 (47)	11.7 {119}	810	+ 5	- 25	- 40	16	1000h No Change		BAH50470	TEKM5010
	<60>	60 (59)	12.6 {129}	560	+ 8	- 3	- 32	10	〃		BAH60460	TEKM6010
	<65>	62 (61)	13.3 {136}	630	+ 5	- 6	- 31	11	〃	0.8	BAH65460	TEKM6510
	<70>	70 (69)	12.0 {122}	540	+ 5	+ 9	- 30	11	〃		BAH70450	TEKM7010
	<80>	77 (76)	13.8 {141}	440	+ 5	+ 9	- 22	14	〃		BAH80420	TEKM8010

JIS K 6250

■ Properties : Colored EPT Rubber Sheet

Item Name \ Properties		General Properties			Heat-Resistant Aging 100℃×72h			Compression Set 70℃×24h %	Ozone Resistance Ozone 50pphm 40℃ 20% Elongation	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 %					
White EPT Sheet -M	<65>	66 (63)	11.5 {117}	650	+ 4	- 26	- 17	35	1000h No Change	1.23	BAH65350	TEWM6507
Gray EPT Sheet -L	<60>	59 (57)	7.5 {77}	810	+ 4	- 26	- 39	35	72h No Change		BAH60360	TEHL6007
Gray EPT Sheet -M	<60>	60 (58)	11.0 {112}	720	+ 4	- 15	- 28	32	1000h No Change		BAH60360	TEHM6007

JIS K 6250

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

Item Name \ Properties		General Properties			Heat-Resistant Aging 125℃×72h			Compression Set 70℃×24h %	Ozone Resistance Ozone500ppb (50pphm) 40℃ 20% Elongation	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 %				
EPT Special Sheet	<40>	40 (39)	10.3 {105}	660	+ 2	+ 4	0	19	1000h No Change	CAH40360	TEKH4007A
	<50>	53 (50)	11.6 {118}	550	+ 2	+ 5	+ 12	17	〃	CAH50470	TEKH5008A
	<55>	56 (53)	14.9 {152}	460	+ 7	+ 12	- 9	15	〃	CAH55470	TEKH5510A
	<60>	60 (57)	15.0 {153}	530	+ 5	+ 3	- 10	26	〃	CAH60360	TEKH6007A
	<70>	71 (66)	12.7 {130}	490	+ 2	0	- 7	16	〃	CAH70450	TEKH7008A
	<80>	80 (77)	16.3 {166}	300	- 3	+ 2	- 9	8	〃	CAH80420	TEKH8010A
	<90>	93 (91)	14.3 {146}	220	+ 2	+ 1	- 26	12	〃	CAH90420	TEKH9010A

- 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 beforehand 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

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 %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903				
Butyl Sheet <50>	50 (48)	7.1 {72}	600	+ 17	+ 9	- 35	—	—	67	—	AAH50261	TIKM5005
<65>	67 (65)	6.7 {68}	450	+ 12	+ 15	- 49	+ 64	+ 153	54	0.8	BAH65252	TIKM6505

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

JIS K 6250

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

CSM Sheet

Chloro-Sulfonated polyethylene Rubber Sheet

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 %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903				
Hypalon Sheet <70>	69 (65)	17.4 {177}	270	+ 6	+ 9	+ 20	- 3	+ 56	62	1.03	BAH70451	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

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 immo derately burned.
・The user is requested to confirm degree of discoloration and contamination beforehand 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

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	AAH50455	TSKM5010
	<60>	60 (60)	8.2 {84}	410	+ 7	+ 19	- 12	23	AAH60363	TSKL6007
	<65>	66 (64)	8.9 {91}	340	+ 8	+ 4	- 16	22	AAH65233	TSKL6505
	<70>	68 (67)	12.8 {131}	470	+ 2	0	- 2	11	AAH70453	TSKM7010
	<90>	92 (89)	10.4 {106}	300	+ 2	+ 6	- 30	28	AAH90343	TSKL9007

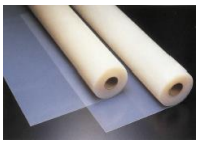
JIS K 6250

・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 beforehand 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 Sheet

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



■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 100℃×72h			Oil Resistance 150℃×72h	Compression Set 180℃×24h %	Elastic Modulus in Static Shear Mpa	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 %	Volume Change Rate % IRM 903				
SR-30	30 (30)	6.9 {70}	720	- 5	- 24	+ 8	+ 69	36		FAH30140	—
SR-40	40 (40)	8.7 {89}	490	0	- 1	- 8	+ 59	35		FAH40260	—
SR-50	51 (51)	10.3 {105}	410	+ 1	- 24	- 27	+ 49	41	0.7	FAH50250	General
SR-60	61 (61)	8.2 {83}	310	+ 3	+ 6	- 22	+ 42	20		FAH60240	—
SR-70	70 (70)	6.3 {65}	240	+ 2	+ 14	- 27	+ 35	23	1.5	FAH70230	General
Red SR-40	40 (40)	8.7 {88}	460	+ 1	- 2	- 7	+ 56	31		FAH40260	—
Red SR-50	50 (50)	9.1 {93}	390	+ 1	- 10	- 18	+ 51	31	0.7	FAH50250	General
Red SR-60	60 (60)	8.7 {89}	320	+ 1	- 1	- 26	+ 42	24		FAH60240	—
Red SR-70	68 (68)	6.9 {71}	240	+ 5	+ 13	- 26	+ 39	24		FAH70230	—
SR-1050	53 (53)	9.5 {97}	690	+ 3	- 14	- 13	+ 60	53		FAH50350	High-strength
SR-151	51 (51)	10.8 {110}	520	+ 11	- 1	- 20	+ 57	59		—	—

JIS K 6250

- Please consult us in advance because there is a case even general item might be a custom-made product depending on the size.
- These items highlighted in this color are our standard products.

■ SR Ultrathin Sheet

Features

- Excels in heat resistance.

Applications

- Parts for electronic device.

■ Properties : One side cross pattern / sandy surface

Item Name	General Properties		
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm²}	Elongation at Break %
One side cross pattern / sandy surface	50	8.5 {87}	390

■ Specification

Specification	Product Dimension (Standard Size)			Color Standard
	Thickness mm	Width m	Length m	
One side cross pattern / sandy surface	0.2	1	2	Black

- Although the standard length is 2M, it can be changed depending on an application.
- Thickness tolerance: ±0.05

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 mm	Length m	
High Precision Ultrathin SR Sheet	0.1～0.3	500	10	Mirrored

- This product shrinks approx. 2.5% in the case that the laminated PET film is peeled off.
- Thickness tolerance:±0.02 for 0.1t and 0.2t, ±0.03 for 0.3t.

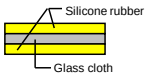
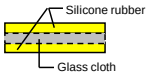
⚠
- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it beforehand by using sample in the 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 co ntaminated 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.)
- Cover for heavy industry machine.

■ Structure and types

Item Name	Structure	Product Dimension (Standard Size)			Color Standard
		Thickness mm	Width m	Length m	
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 film and silicone rubber.

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)	1.0～3.0	1	2

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

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・The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm itbeforehand 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.

SR Sponge Sheet

Silicone Rubber Sponge Sheet

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

■Highly Foamed Silicone Rubber Sponge Sheet

Features

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

Applications

- Various gaskets, packings and etc.
- 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/cm^3	General Properties			Compression Set 150℃×24h %	Heat-Resistant Aging 230℃×72h			Heat Thermal Conductivity W / (m･K)	Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %		Hardness Change Type E	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %		
SR Sponge Sheet E15	0.33	15(15)	1.0 {10.2}	250	8	+ 2	- 55	- 48	5.0 × 10^{-2}	Red

JIS K 6250

- Condition of compression set : Measured in 3hrs after removing 40% compression load.
- Please consult us the grades other than listed above.
- Test method of the heat thermal conductivity : Compliant with JIS A 1414-2: 1999 (HFM method)
- Please consult us on colors other than the above mentioned standard color.

■ Dimension : Width × Length : □500mm

Thickness (mm)	Tolerance (mm)	Surface Condition	
		Both sides skin	One side skin
1.5	± 0.3	×	○
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	○	×

○ : 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 beforehand 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 co ntaminated 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 onthe degree of compression.
- Closed cell structure.
- Expansion ratio: Approximately double times.
- Larger size is available than Highly Foamed Silicone Rubber Sponge Sheet.

Applic Applications

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

■ Properties : Low Foamed Silicone Rubber Sponge Sheet

Properties / Item Name	Apparent Density g/cm^3	General Properties			Compression Set 150℃×24h %	Heat-Resistant Aging 230℃×72h			Heat Thermal Conductivity W / (m･K)	Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm^2}	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	1.2 × 10^{-1}	Red

JIS K 6250

- Condition of compression set : Measured in 30 min. after removing 25% compression load.
- Please consult us on grades other than listed above.
- Please consult us on colors other than the above mentioned standard color.
- Test method of the heat thermal conductivity : Compliant with JIS A 1414-2: 1999 (HFM method)

■ Dimension ･Width1m×Length2m ･Surface Condition: with both side skin

Thickness (mm)	Tolerance (mm)
2	± 0.5
3	± 0.5
4	± 0.5
5	± 0.5

Thickness (mm)	Tolerance (mm)
6	± 0.6, - 0.5
7	± 0.7, - 0.5
8	+ 0.8, - 0.5
10	+ 1.0, - 0.5

Thickness (mm)	Tolerance (mm)
11	+ 1.1, - 0.5
12	+ 1.2, - 0.5
15	+ 1.5, - 0.75
20	+ 2.0, - 1.0

Surface condition : with both side skin

- 1m×3m is also available as custom made product.
- Please consult us on sizes other than listed above.
- These items highlighted in this color are our standard products.

･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 itbeforehand 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.

■ 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 times.

Applications

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

■ Properties : SR Flame-Retardant Sponge Sheet

Properties / Item Name	Apparent Density g/cm^3	General Properties			Compression Set 150℃×24h %	Heat-Resistant Aging 230℃×72h			Heat Thermal Conductivity W / (m･K)	Color Standard
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %		Hardness Change Type E	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %		
SR Flame-Resistant Sponge Sheet	0.36	20(20)	0.7 {7.20}	190	16	+ 2	- 30	- 45	6.1 × 10^{-2}	Gray

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

JIS K 6250

■ Dimension ･Width×Length :500×500mm

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

Thickness (mm)	Tolerance (mm)	Surface Condition	
		Both sides skin	One side skin
8	± 0.8	△	△
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 beforehand 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.

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 230℃×72h			Oil Resistance 150°C×72h	Compression Set 150℃×72h %
	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 %	IRM 903 Volume Change Rate %	
TFB 8010	81(76)	16.0{163}	230	+7	-13	-39	-4	20
FR Sheet <HS80>	78(75)	10.5{107}	360	+5	-53	-51	+3	47
TFB 6007	62(60)	9.3 {94.9}	320	+4	+13	-15	+7	12

- These items highlighted in this color are our standard products.
- TFB 8010 is not an electric isolating type.
- Please consult us about the thickness tolerance of TFB6007.

Aflas® Rubber Sheet

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 230℃×72h			Oil Resistance 150°C×72h	Compression Set 150℃×72h %	Remarks
	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 %	IRM 903 Volume Change Rate %		
Aflas Rubber Sheet	82 (75)	17.6 {180}	210	0	-50	-4	+7	27	Special order product

・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 itbeforehand 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

Flouro Sponge Sheet

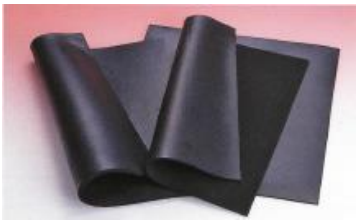
■ FR Sponge Sheet

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 times
- Closed cell.

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		○	×	×
2	± 0.4	500 × 500	×	○	△
5	± 0.5		○	○	
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

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

■ Heat Thermal Conductivity

Heat Thermal Conductivity W / (m･K)
5.9 × 10^{-2}

- Test method of the heat thermal conductivity
  : Compliant with JIS A 1414-2: 1999 (HFM method)

■ 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

JIS K 6250

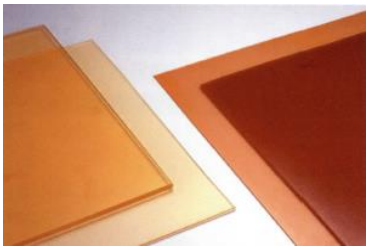
- These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immoderately burned.
- The life of these products at actual use are greatly affected by condition of the use. The user is requested to confirm it beforehand by using sample in the 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.

Urethane Rubber Sheet

Urethane Rubber

Ti-Prene®

Rubber-like elastic bodies obtained by the reaction of polyester or polyether with isocyanate are collectively called urethane rubber. Ti-Prene® is a trademark of our urethane rubber.



Features

Mechanical Strength

Due to its chemical structure, it has a strong secondary bond between molecules, so it has the highest strength among elastic bodies, and because of its high modulus, it is to be less deformed and can withstand heavy loads even with small objects. Due to its high hardness and high elongation, it is to be less susceptible to damage due to impact.

Abrasion Resistance

It has more than 10 times more abrasion resistance than natural rubber. It is to be superior to metal in some conditions of use.

Oil Resistance

It has excellent resistance to most oils, including petroleum-based oils. Especially excellent for mineral oil (only for use at room temperature).

Heat Resistance

The using limit temperature is 70 ° C. Avoid using continuously at 70 ° C or more.

Cold Resistance

It has rubber elasticity and mechanical strength even at -25 ° C or less.

Water Resistance

Please avoid using it in a hot and humid environment because it has the property of being easily hydrolyzed.

Ozone Resistance

It is hardly affected by ozone because it does not contain unsaturated parts in its molecular structure.

Weather Resistance

Please be noted that when used outdoors for a long period of time, the effects of water, humidity, light, etc. may cause deterioration of physical properties and discoloration.

Applications

- General packing, gasket material.
- Cushion material.
- Coupling.
- Bush.
- Scraper.
- Base material for rollers.
- Spring, dice.

- It does not meet food hygiene tests.

■ Properties : Urethane Rubber Sheet

Properties / Item Name	General Properties			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
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %						
TR 100-90	91 (89)	52.1 {531}	430	21.2 {216}	90.3 {92}	27	0.080	34	Standard material (Polyester basis)
TR 100-70	70 (69)	27.7 {283}	630	3.6 {36.7}	36.4 {37}	28	0.200	50	
TR 100-60	60 (60)	23.7 {242}	740	3.2 {33}	36.6 {37}	37	0.300	40	
TR 100-50	50 (50)	26.6 {271}	610	2.5 {26}	28.6 {29}	10	0.100	31	
TR 200-90	91 (89)	35.1 {358}	430	21.7 {221}	86.8 {89}	30	0.370	37	Standard material (Polyether basis)
TR 1000-90	90 (90)	42.0 {429}	450	16.0 {163}	74.7 {76}	24	0.080	50	Special grade (Polyether basis)

JIS K 6250

- Abrasion loss is by Akron abrasion test.
- Please consult us about various grades other than listed above.

⚠
・These products should not be incinerated wherever possible because harmful gas to humans might be generated if they are immo derately 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 beforehand by using sample

■ Ti-Prene Sheet

■ Dimensions

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.

■ Antistatic Urethane Rubber Sheet (Ti-Prene Sheet)

It is a urethane rubber that imparts antistatic effect to general purpose one.

Properties / Item Name	General Properties			Tensile Stress M300 MPa {kgf/cm2}	Tear Resistance N/mm {kgf/cm}	Compression Set 70°C × 24h %	Abrasion Loss cc/1000 times	Impact Resilience %	Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %						
Black TR200-90E	89 (88)	31.3 {319}	510	14.0 {143}	77.4 {79}	32	0.400	36	Special grade (Polyether basis)

JIS K 6250

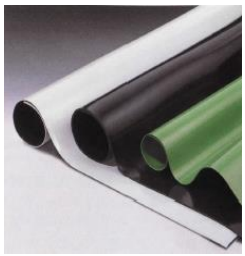
Properties / Item Name	Volume intrinsic resistivity value 102 Ω cm
Black TR200-90E	3.8×10^{9}

Note : TR200-90 Volume intrinsic resistivity value : 5.5×10^{13}

- 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 beforehand 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.

Conductive Rubber Sheet

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

Item Name \ Properties		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
	ASTM #1 Volume Change Rate	%	—	+ 13	- 3	—	+ 19	- 1
	IRM 903 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 JIS K 6250
- Volume intrinsic resistivity : Please refer to Page 23
- Please consult us for a conductivity depends on its usage.

■ 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

Item Name \ Properties		Unit	EC-8 (ECC-8)
Hardness		Type A	70 (62)
Oil Resistance	ASTM #1 Volume change Rate	%	+ 1
	IRM 903 Volume change Rate	%	+ 35
Volume Intrinsic resistivity	before aging	Ω·cm	7.9×10^8
	after aging 70℃ X 72h	Ω·cm	2.5×10^8

- Volume Intrinsic Resistivity : Please refer to Page 23

■ Dimension

Item Name	Thickness mm	Width (m)	Length (m)	Color Standard
EC	1-3	1	10	Green
ECC	2-3	1	10	Green

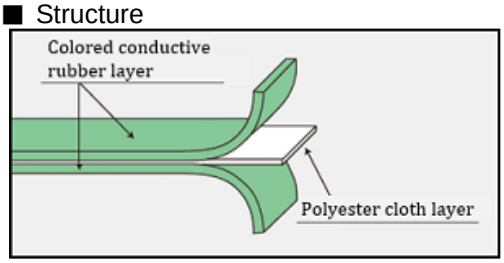
- Please consult us on sizes other than the above listed.

■ EC-8N (Cloth-inserted) Sheet　　Volume Intrinsic 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



■ Dimensions

Item Name	Thickness mm	Width m	Length m	Color Standard
EC-8N	2	1	10	Green
	3	1	10	Green

- Please consult us on the other colors and sizes

■ EC - 8H Sheet

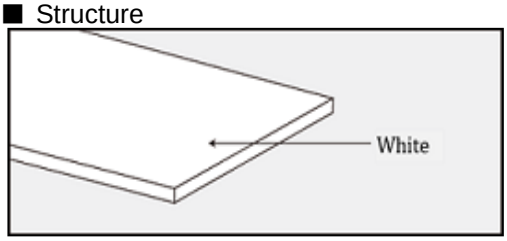
Features

- 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 andtrucks smooth.

Applications

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

■ 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

JIS K 6250

■ Dimensions

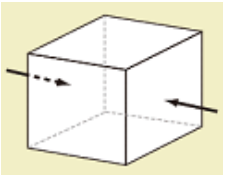
Item Name	Thickness mm	Width m	Length m	Color Standard
EC-8H	1~3	1	10	White

- Please consult us on the other colors and sizes.

Volume Intrinsic Resistivity

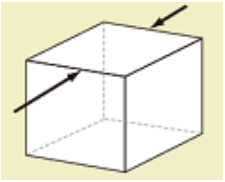
	10^{-8}	10^{-4}	1(10°)	10^{4}	10^{8}	10^{12}	10^{16}
Metal or Other	Ag Cu	Ni Fe		Graphite Carbon Ge	Glass	Phenol Resin PE (Polyethylene)	Epoxy Resin
Rubber				EP-2	EP-5	EC-8 EC-8N	Non- Conductive Rubber	Silicone Rubber
General Classification	Conductivity			Semiconductor		Insulator	

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: 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: Ω

Measurement Test Result of Leak Resistance of Workfloor

■ **Test Type**

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}

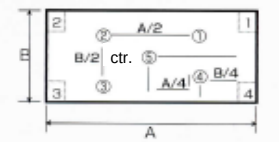
(Applied voltage 100V D.C.)

■ **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)	11.1 {113}	530	22.6	NR (Black)
Amber Rubber Sheet (60%) <45>	47 (47)	19.1 {195}	680	18.6	NR (Amber)
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)
<65>	61 (60)	10.0 {102}	600	22.1	EPT (Black)
TNB 9012 S	90 (88)	15.0 {153}	340	7.4	NBR (Black)
SR-50 <50>	51 (51)	10.3 {105}	410	16.7	SR (Natural)
FR Sheet <80>	78 (75)	10.5 {107}	360	2.2	FR (Black)

N/C: Non-Conductive W/R: Whether Resistance JIS K 6250

- 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 (Raw Material) Rubber Sheet

Features

- The raw materials are confirmed to conform to the food hygiene test.
  (The conformity has been confirmed by a third-party organization.)

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
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	
TEB 6510 Z	60 (57)	12.8 {131}	730	EPT
White Butyl Sheet <65>	67 (66)	8.4 {85}	600	IIR
White EPT Sheet <65>	66 (63)	9.6 {98}	690	EPT
SR-50	50 (50)	8.5 {87}	320	SR
SR-70	70 (70)	7.1 {72}	290	SR

JIS K 6250

Rubber Sheet for Waterworks

Features

- Conforms to the standard of rubber sheet for waterworks specified in JIS K 6353.

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

Applications

- Various packing material for waterworks.

■ Properties : Rubber Sheet for Waterworks

Item Name \ Properties	General Properties			Heat-Resistant Aging 70℃×96h			Material	Remarks
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Type A	Change Rate of Tensile Strength %	Change Rate of Elongation at Break %		
S-0360	60 (59)	12.9 {131}	400	+4	+5	−20	SBR	Complies with 60, class 3
S-0375	73 (72)	20.9 {213}	430	+5	+1	−27	SBR	Complies with 75, class 3
C-0360	62 (62)	18.4 {187}	510	+2	−13	−15	CR	Complies with 60, class 3
E-0375	74 (73)	13.6 {138}	480	+1	+3	−3	EPT	Complies with 75, class 3

- The standard rubber sheet for waterworks : Please refer to Page 39

JIS K 6353

Conforming Sheet of Expressway Standard

Features

- Conform to each standard.

■ Properties : Conforming Sheet of Expressway Standard

Properties / Item Name	General Properties			Heat-Resistant Aging 70℃×168h			Ozone Resistance 100ppb (100pphm) 40℃×40% Elongation
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm2}	Elongation at Break %	Hardness Change Type A	Tensile Strength at Break MPa {kgf/cm2}	Change Rate of Elongation at Break %	
Gray EPT Sheet (HS60)	60 (58)	11.0 {112}	720	+ 4	7.0 {71}	570	96h No change

JIS K 6250

■ 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		Compression Set 70℃×24h %	Ozone Resistance 2000 ppb (200pphm) 40℃×80% Elongation
		Hardness Type A	Tensile Strength at Break MPa {kgf/cm2}	Elongation at Break %	25% 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	8	408h No change
Vibration Isolation Rubber C-10	0.98 {10.0}	61 (57)	16.2 {165}	500	+ 35	- 7	15	408h No change

■ Properties : NEXCO Structure construction management procedure For menase hinges Properties JIS K 6250

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 500 ppb (50pphm) 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	1.18 {12}	66 (62)	6.5 {66}	390	+ 25	- 14	27	96h No change

JIS K 6250

Vibration Isolation Rubber Sheet

Features

- Conform to 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 IRM 903 Volume Change Rate %	Heat-Resistant Aging 100℃×72h		Compression Set 100℃×24h %	Ozone Resistance 500 ppb (50pphm) 40℃×20% Elongation
		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	72h No change
(C-08)	0.78 {8.0}	53 (53)	17.1 {174}	510	+ 74	+ 72	- 23	13	72h No change
(C-10)	0.97 {9.9}	61 (59)	9.8 {100}	370	+ 98	+ 77	- 40	35	72h No change

R/S=Rubber Sheet JIS K 6250

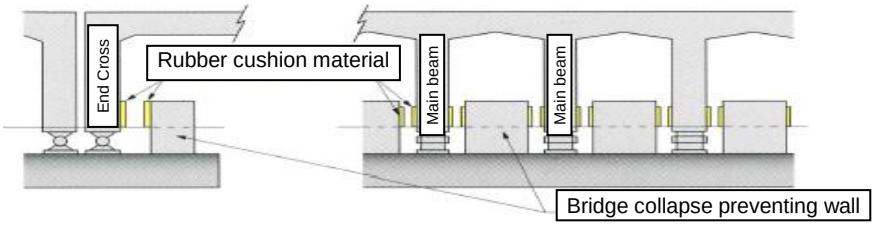
Bridge Collapse Preventing Cushion Rubber

Features

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

■ Properties : Bridge Collapse Preventing Cushion Rubber

Hardness Type A	Allowable bearing stress MPa {kgf/cm2}	Material
55±5	11.8 or more {120 or more}	Chloroprene rubber



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

Item Name \ Properties		General Properties			Heat-Resistant Aging 70℃×168h			Compression Set 70 °C × 24h %	Abrasion Loss cc/1000 times
		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 %		
Abrasion Resistant L Sheet	<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
	<80>	82(80)	14.6 {149}	440	+4	0	-16	20	0.357
Abrasion Resistant H Sheet	<60>	61(61)	24.8 {253}	580	0	-8	-17	16	0.050
Abrasion Resistant LK Sheet	<65>	67(66)	22.1 {225}	460	+5	-1	-13	17	0.130

- Abrasion loss shall be measured by Akron Abrasion Tester. JIS K 6250
- These items highlighted in this color are our standard products.

Note) Abrasion comparison data: Black Normal Sheet<65>1.130
NBR Sheet-L<70>0.743
CR Sheet –L<65>0.620

Shock Absorbing Rubber Sheet (Ti-Hanenon®)

(Ti-Hanenon ® is a registered trademark of our shock absorbing rubber.)

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 230℃×72h			Oil Resistance 100℃×72h		Ozone Resistance Ozone 500ppb(50pphm) × 40°C×20% Elongation × 72h	Impact Resilience %
		Hardness Type E	Tensile Strength at Break MPa {kgf/cm^2}	Elongation at Break %	Hardness Change Type E	Change Rate of Tensile Strength at Break %	Change Rate of Elongation at Break %	Volume Change Rate % ASTM #1	Volume Change Rate % IRM 903		
Ti-Hanenon	<65>	62(49)	3.6{38	840	+ 3	+ 11	- 8	- 3	- 13	No change	7
	<35>	35(25)	6.2{63}*1	1000 or more	+ 10	10.3*^{2}	820*^{2}	- 11	+ 27	C-4	6

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

Note(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.

- The above mentioned values are not standard values, but measured values.

■ Specification

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.

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

■ 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
Polyester	—	30 / 1 x 30 / 1	90 x 88	0.15	32	11
Glass-Cloth	—	—	84 x 64	0.18	164	—

Non-Contaminating Rubber Sheet

Features

- Please confirm before use of these rubbers although they do notcontaminate metal and plastic much.

Applications

- Seal material for plastic molding.

■ Properties : Non-Contaminating Rubber Sheet

Properties / Item Name	General Properties			Heat-Resistant Aging 100℃ × 72h			Compression Set 70℃ × 24h %	Material
	Hardness Type A	Tensile Strength at Break MPa {kgf/cm^2}	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

JIS K 6250

Flame-Retardant Rubber Sheet

Features

- Conforms to various flame retardant standards.

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

Test Items		Material / Unit	CR			SR
			ULCR0160	CR(M) Flexble Flame Retardant <HS50>	CR Flame Retardant <HS65>	SR-50
Hardness		TypeA	63(61)	50(50)	65(64)	51(51)
Tensile Strength at Break		Mpa {kgf/㎠}	9.5{97}	16.5{168}	9.8{100}	10.3{105}
Elongation at Break		%	550	680	510	410
Tear Resistance		kN/m	25.7	32	21.3	24.7
Compression Set (70°C×24h)		%	-	18	28	41 *1
Compression Set (100°C×72h)		%	49	-	-	-
Heat Aging Resistance (100°C×72h) Hardness Change		TypeA	+4	+10	+18	+1 *2
Change Rate of Tensile Strength at Break		%	-15	-19	-2	-24
Change Rate of Elongnation at Break		%	-19	-29	-40	-27
Ozone Resistance 500ppb×40°C×20% Elongnation×72 h		-	*3 C-1	72h No change	72h No change	72h No change
UL Standards	Ignition class	-	V-0	-	-	-
	Minimum thickness	mm	0.305	-	-	-
	Registration file No.	-	E60836	-	-	-
Flame retardant tests for railway vehicles 【Domestic railroad in Japan】		-	○	○	○	○

- The data are tested values and not standard ones. They are subject to change without notice.

○ applicable

*1 The condition is to be exposed at 200 degrees Celsius and for 24 hours.

*2 The condition is to be exposed at 200 degrees Celsius and for 72 hours.

*3 The condition is to be exposed at the density of 500ppb, 40 degrees Celsius, with 10% elongation and for 24 hours.

(NOTE)

For flame-retardant tests for railroad vehicles, it is necessary to determine whether or not they are compatible with each thickness, so please consult us separately.

UL

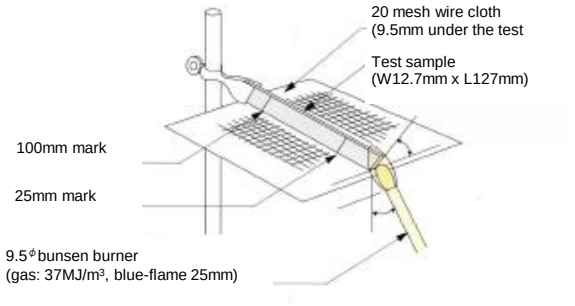
Underwriters Laboratories Inc. (UL), which has over 100 years of history, is the independent test and certification organization established in 1894 in the USA for the purpose of contribution to the public safety.
The main activity is to formulate various product specifications, and to provide product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

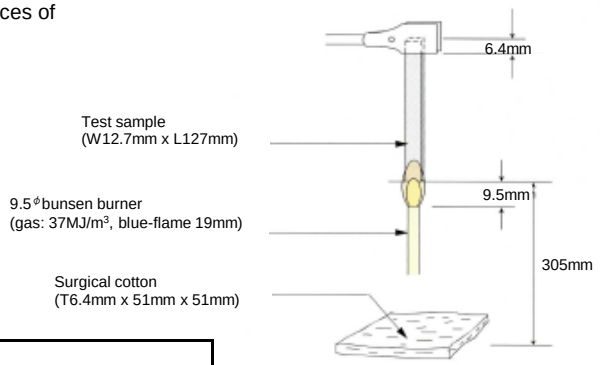
Class	Test Sample Thickness (mm)	Number of Test Sample	Burning Time (sec)	Acceptance Criteria
UL94HB	3.0～13.0	3	30	Burning speed should not over 40mm/min in 75mm section, or burned out before reaching 100mm mark
	Less than 3.0	〃	〃	Burning speed should not over 75mm/min in 75mm section, or burned out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

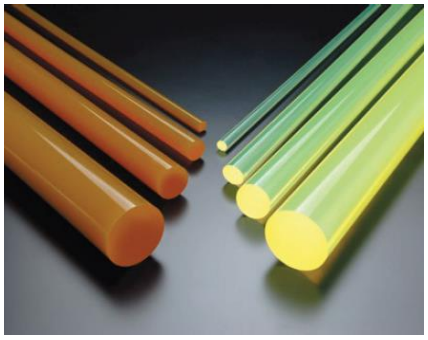
Follow Up

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.

Ti-Prene® round rod / pipe

■ Properties : Round Rod

Diameter(mm)	Length(mm)	Grade(mm)
10,15,20,25 30,35,40,45,50 60,70,80,90,100	1	TR200-90 TR100-90 TR100-70 TR100-60 TR100-50



■ Properties : Pipe

Outer Diameter (mm)	Innar Diameter (mm)	Length (mm)	Grade (mm)
30,40,50 60,70,80,100	10-60	0.5	TR200-90 TR100-90 TR100-70

Please contact us on grades and sizes other than listed above.

Ti-Prene® Molded Products

Please contact us.

Silicone Rubber and Fluoro Rubber Moldings

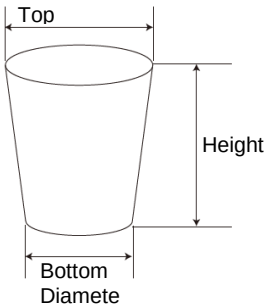
■ Fluoro Rubber Stopper

Features

- Excels in heat resistance.
- Excels in chemical and oil resistance.

Applications

- Test tube, Flask, etc.



■ Properties : Fluoro Rubber Stopper

Properties / Item Name	Hardness TypeA	Tensile Strength at Break MPa{kgf/cm2}	Elongation at Break (%)	Color Standard
FR70	73(71)	8.8 {89.7}	250	Brack

JIS K 6250

■ Sizes

Nominal No.	Top Diameter (mm)	Bottom Diameter (mm)	Height (mm)
0	12	9	18
1	15	12	22
2	16	14	22.5
3	17	15	22.5
4	20	17.5	24.5
5	21	18	26.5
6	23	20	26.5
7	24.5	20.5	30.5
8	26.5	23	31
9	29.5	24	31.5
10	32	27	34
11	34	30	35
12	35	32	35.5
13	38	34	38
14	41	38	40
15	44	41	41

Nominal No.	Top Diameter (mm)	Bottom Diameter (mm)	Height (mm)
16	47.5	41.5	42
17	50.5	43.5	45
18	50.5	47.5	45.5
19	54	47	52
20	56.5	51	48
21	63.5	57	48
22	65	61.5	46.5
23	71	63	48.5
24	72	66	47
25	76	69	47
26	81	74	45.5
27	83	76	45
28	86.5	80	45
29	88	82	46.5
30	92	86	46

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	(MPa)
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.

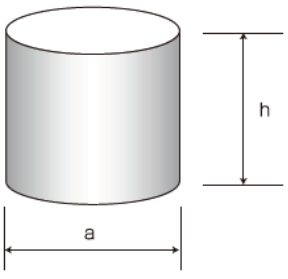
S = Area of load (A_L) / Free area (A_F)

- Area : m^2 or cm^2

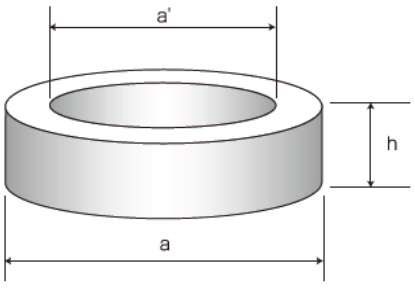
(Note) Area of load (A_L) : Total area where receives load.
For the following figures, it shall be the one side's area of upper and lower side.

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).

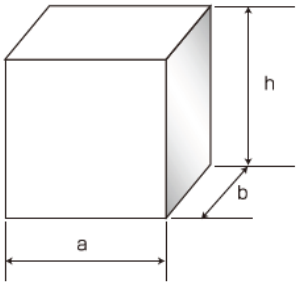
[Cylinder]
S = a / 4h



[Tubular]
S = (a−a') / 4h



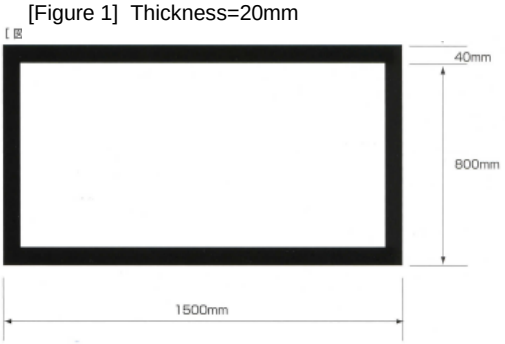
[Quadratic Prism]
S = ab / 2h(a+b)



[Calculation Example]

Calculate a strain amount of frame gasket tightened by 9800N.
The frame gasket is made by NBR (L)<Hs70> shown in Figure 1.

[Figure 1] Thickness=20mm



<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.

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

$$S = \text{Area of load} / \text{Free area}$$

$$= \frac{(1.5 \times 0.84) - (1.42 \times 0.76)}{2 \times 0.02 \times (1.5+0.84+1.42+0.76)}$$

$$= \mathbf{1.0}$$

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

$$Eap = Gs\,(4+3.29S^2)$$

$$= 1.15 \times (4+3.29 \times \mathbf{1}^2)$$

$$= 8.384\ (MPa)$$

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) = 9800(N)

A_L (Area of load) = (1.5×0.84) - (1.42×0.72) ≒ 0.18(m^2)

$9800\ (N) = 8.384(MPa) \times 0.18\ (m^2) \times A\,(\varepsilon)$

$A\,(\varepsilon) \fallingdotseq \mathbf{0.0064}$

Read out from Table 1.

ε <0.65% So the strain is 20 (mm) × 0.0064=0.13 (mm)

Result The above frame gasket strains appox. 0.13mm.

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 (ε)

Strain : - ε %	A (- ε)
0	0.000000
0.5	0.005050
0.65	0.006565
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)

- **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.

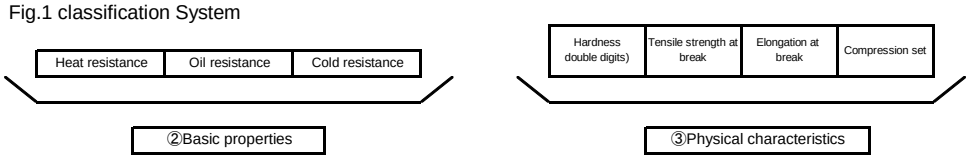
- **Classification**

①Classification System

In order to specify the rubber packing material, the classification by the seven performance items shown in Fig. 1 must be included. Each rubber packing material is classified according to the basic properties specified in ② and the physical characteristics specified in ③.

However, when it is necessary to change a part of the basic properties or a part of the physical characteristics shown in Fig. 1 or add another properties, by agreement between the parties, additional properties may be indicated by additional signs, test method classification numbers and test temperature classification ones.

Fig.1 classification System



②Basic properties

1) Heat resistance

Table 1 shows the classification of heat resistance of rubber packing materials.

When heat aging is continued for 72 (0, -2) hours using JIS K6257 accelerated aging test A method or AA-2 forced circulation type heat aging tester (crosswind type) (also called gear type aging tester), for the heat resistance classification from A to K, the upper limit test temperature that satisfies the provisions shown in Table 1 is the heat resistance classification.

Table 1 Classification of Heat Resistance

Heat resistance	Test Temperature (1) ℃	Heat resistance		
		Change Rate of Tensile Strength	Change Rate of Elongation at Break	HardnessChange
A	70	within ±30%	within -50%	within ±15
B	100			
C	125			
D	150			
E	175			
F	200			
G	225			
H	250			
J	275	Test Method JIS K 6251	Test Method JIS K 6251	Test Method JIS K 6253-2, -3
K	300			

Note (1) The test temperature is at the time of the accelerated aging test, and does not necessarily mean the one that can be withstood during actual use.

2) Oil resistance

Table 2 shows the classification of oil resistance of rubber packing materials.

Using the test lubricating oil No. 3 oil by the method specified in JIS K6258, the classification of oil resistance of A to G is defined from the volume change rate when immersed for 72 (0, -2) hours continuously at a test temperature of 100±1 ℃.

Table 2 Classification of Oil Resistance

Oil Resistance	Range of volume change rate(2) %
A	More than 140 (or not specified)
B	121~140
C	81~120
D	41~80
E	21~40
F	0~20
G	Less than 0 (Negative volume change rate)

Note (2) The range of volume change includes swelling due to oil absorption or shrinkage due to oil extraction.

3) Cold resistance

Table 3 shows the classification of cold resistance of rubber packing materials.

The cold resistance classification of A to H is based on the 50% impact embrittlement temperature specified in JIS K6261.

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The cold resistance classification of A to H is based on the 50% impact embrittlement temperature specified in JIS K6261.

Table 3 Classification of Cold Resistance

Cold Resistance	50% impact embrittlement temperature(3) ℃
A	0
B	-10
C	-25
D	-40
E	-55
F	-75
G	-85
H	Not specified

Note (3) The impact embrittlement limit temperature can be specified by the additional properties of the additional sign “F” by agreement between the parties.

③Physical characteristics

The methods of representing and classifying the physical characteristics of the rubber packing material are as follows.

a) The methods of representing the physical characteristics

The physical characteristics of the rubber packing material are represented by the following five-digit numbers (see Fig. 2).
And an example is shown in Fig. 3.

1) First and second digits represent hardness [Type A durometer or IRHD (N method)] design values (two-digit integers).
2) Third digit represents a minimum tensile strength value (MPa).
3) Fourth digit represents a minimum value of elongation at break (%).
4) Fifth digit represents a maximum value of compression set (%) at the test temperature specified by ②1) heat resistance.

Type A durometer is to be used as the hardness test method.
However, when IRHD (N method) is used, [IRHD (N method)] is to be added at the end.

Fig.2 Methods of representing the physical characteristics

Hardness (two digits)	Tensile strength	Elongation at break	Compression set

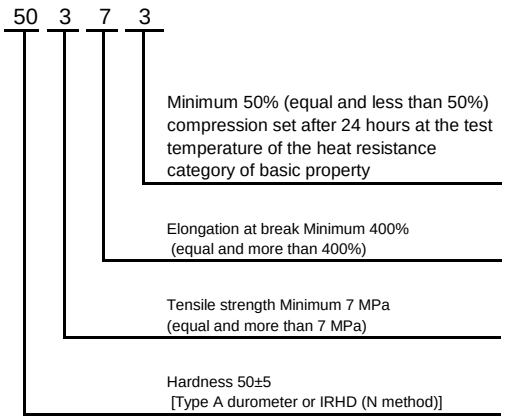
b) The methods of classifying the physical characteristics Table 4 shows the classification for physical characteristics.

Table 4 Classification of numbers

Hardness		Tensile strength		Elongation at break		Compression set	
Numbers	Allowable tolerance of Type A durometer or IRHD (N method)	Numbers	(Min) Mpa	Numbers	(Min) %	Numbers	(Min) %
Design values (two-digit integers)	within ±5	0	Not specified	0	Not specified	0	Not specified
		1	3	1	50	1	80
		2	5	2	100	2	60
		3	7	3	150	3	50
		4	10	4	200	4	40
		5	14	5	250	5	30
		6	17	6	300	6	25
		7	20	7	400	7	20
		8	25	8	500	8	10
		9	35	9	600	9	5
Test Method JIS K 6253-2, -3		Test Method JIS K 6251		Test Method JIS K 6251		Test Method JIS K 6262	

Note (4) The test conditions for the compression set are the measurement after 24 hours have passed at the test temperature specified by ②1) heat resistance.

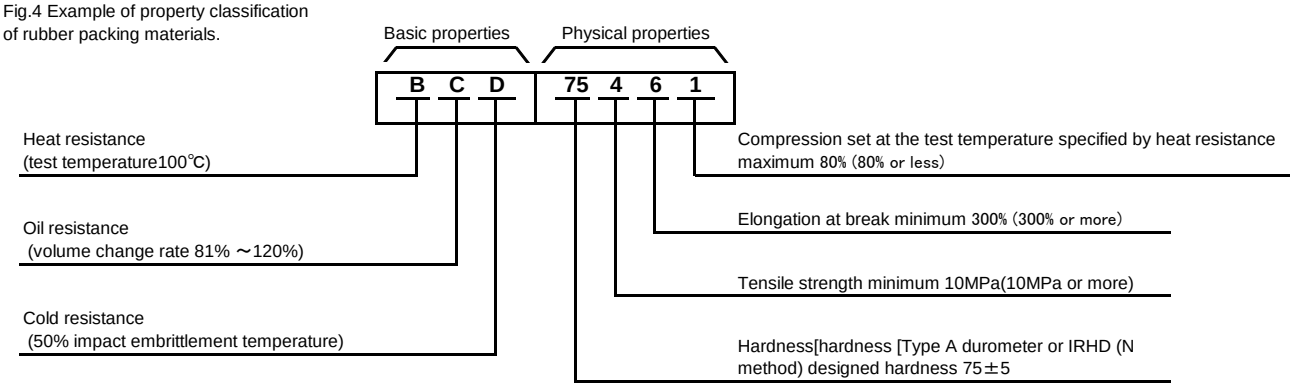
Fig.3 Example of representing the physical characteristic



④Example of property classification of rubber packing materials

Fig.4 shows an example of the property classification of rubber packing materials.

Fig.4 Example of property classification of rubber packing materials.



Appendix A (reference) Method of representing additional properties

Additional properties: The additional properties define the test conditions using additional signs, test method classification numbers, and test temperature classification numbers when there are necessary required characteristics other than the basic properties and physical characteristics test items.

Table A.1- Classification of additional signs representing additional properties

Additional Code		Special Performance	Additional Code	Special Performance
A		Heat resistance (Heat aging)	H	Flex resistance
B		Compression set, tension set	J	Abrasion resistance
C		Ozone resistance (static and dynami	K	Adhesion properties
D		Compressive stress relaxation	L	Gas permeability
E(※5)	EO	Oil resistance (Lubricant oil)	O	Electrical properties
	EF	Oil resistance (Fuel oil)	P	Staining properties, contact properties
	EA	Water resistance	R	Impact resilience
	EN(※6)	Chemical resistance	S	Dynamic properties
F		Cold resistance	T	Static tensile properties
G		Tear resistance	U	Leachability

Note (5) Additional sign "E" includes a test of liquid which causes physical change by swelling.

Note (6) Additional sign "EN" includes a test of liquid which causes both physical change and chemical one 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/cm^2} (or less)	Tensile Test: Tensile Strength MPa {kgf/cm^2} (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 gland 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]	・Plate-like rubber used on flange surface, conical rubber used in air valve, and round shape plate-like 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.

Note (1) These values are 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

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 residual ※	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 (5)　Values of turbidity, chromaticity, potassium permanganate consumption and reduced amount of chlorine residual shall be got by difference from those measured by blank test.

■ 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.

Chemical Resistance of Rubber Materials

Classification	Chemicals	NR	CR	NBR	EPT	IIR	CSM	SBR	Urethane	Silicone	Fluore
Acid	Sulfurous Acid（10%）	○	○	○	○	○	○	○	×	×	◎
	Hydrochloric Acid (10%)	○	△	○	○	◎	○	○	×	△	◎
	Concentrated Hydrochloric Acid (36%)	×	△	○	○	◎	○	△	×	×	◎
	Hydrogen Peroxide (5%)	○	○	○	◎	◎	○	○	—	◎	◎
	Formic Acid (25%)	○	○	○	◎	◎	◎	○	×	△	△
	Chromic Acid (10%)	×	×	×	○	△	△	×	×	△	◎
	Acetic Acid (10%)	○	○	○	○	◎	○	○	×	○	×
	Nitric Acid (10%)	×	○	△	○	○	○	△	×	×	△
	Nitric Acid (60%)	×	×	×	×	△	△	×	×	×	△
	Sulfuric Acid (10%)	△	○	△	◎	○	○	○	△	×	◎
	Concentrated Hydrochloric Acid (98%)	×	×	×	○	△	△	×	×	×	◎
	Phosphoric Acid(75%)	×	△	×	○	○	◎	△	○	×	◎
Alkali	Ammonia Aqueous	△	○	×	◎	○	○	×	×	○	×
	Sodium Hypochlorite	×	△	△	○	○	○	×	×	△	○
	Calcium Hydroxide	○	◎	◎	◎	◎	◎	○	○	○	◎
	Sodium Hydroxide (30%)	○	○	△	○	◎	○	○	×	×	△
Organic Chemicals	Acetaldehyde	△	×	×	○	◎	△	×	×	○	×
	Acetone	×	○	×	○	◎	×	○	×	×	×
	Aniline	×	×	×	○	○	×	×	×	×	△
	Dichlorobenzene	×	×	×	×	×	×	×	×	×	○
	Xylene	×	×	×	×	×	×	×	×	×	○
	Cresol	×	△	△	×	×	△	×	×	×	△
	Ethyl Acetate	×	×	×	○	○	×	×	×	△	×
	Carbon Tetrachloride	×	×	×	×	×	×	×	×	×	◎
	Cyclohexane	×	×	○	×	×	×	×	○	×	○
	Diethyl Ether	×	△	×	×	×	×	×	○	×	×
	Dibutyl Phthalate	×	×	×	◎	△	×	×	△	○	△
	Toluene	×	×	×	×	×	×	×	×	×	△
	Triethanolamine	○	○	△	○	○	○	○	×	—	×
	Benzene	×	×	×	×	×	×	×	×	×	△
	Methyl Alcohol	◎	◎	◎	◎	◎	◎	◎	×	○	△
Oil, etc.	Linseed Oil	×	△	◎	△	○	△	×	○	◎	◎
	IRM 903	×	×	○	×	×	×	×	○	△	◎
	Gasoline	×	△	○	×	×	△	×	○	×	◎
	Silicone Oil	○	◎	◎	◎	◎	◎	◎	◎	△	◎
	Kerosene	×	△	○	×	×	×	×	○	×	◎
	Bromine	×	×	×	×	×	×	×	×	×	○

◎ : 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.