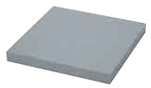
URETHANE SPRINGS

URETHANE SPRINGS

Product name Catalog No.	URETHANES FOR HEAVY LOAD EX	SQUARE URETHANES FOR HEAVY LOAD QX	URETHANE STOCK BLOCKS EST·ESBT·ESU·ESUB·S·SU	URETHANES FOR HEAVY LOAD A
Page	1503	1504	1504	1505

URETHANE STOCK BLOCKS E EL	URETHANES FOR HEAVY LOAD LA·C AX·CX	URETHANES WITH COUNTERBORE AZ AZX	URETHANE SHEETS UT UTH	URETHANE DIE PADS UD UDH
1506	1507	1508	1509	1510

ECONOMY URETHANES AE·LAE·CE·AEX·CEX	URETHANE FOAMS (POROUS) FOR HIGH-DEFLECTION USE PA PLA	LOW REPULSION URETHANES AN·LAN·CNN ANX·CNX	LOW REPULSION URETHANES WITH COUNTERBORE AZN AZNX
1511·1512	1513	1514	1515



LOW REPULSION URETHANE SHEETS UTN	LOW REPULSION URETHANE DIE PADS UDN
1516	1516

Physical properties and features of urethane

Item		Urethanes for heavy load					Urethane foams (porous) for high-deflection use	Low repulsion urethanes
		H type	M type	S type	L type	Economy type		
Hardness (Shore A)		95	90	80	70	90	N/A (foam)	70
Catalog No.		TUS・US・USN	EX・QX・EST ESBT・ESU ESUB・A・E・EL LA・C・AX・CX AZ・AZX・UT UTH・UD・UDH	—	—	AE・LAE・CE AEX・CEX	PA・PLA	AN・LAN・CNN ANX・CNX・AZN AZNX・UTN UDN
Page		P.765 ～ P.768	P.1503 ～ P.1510	—	—	P.1511 ～ P.1512	P.1513	P.1514 ～ P.1516
Tensile strength (Mpa)		45	45	20	15	30	6	15
Elongation (%)		450	550	500	650	540	250	250
300% modulus (Mpa)		18	13	9	4	12	—	—
Repulsion elasticity (%)		23	28	56	51	42	50	6
Tearing strength (N/mm)		140	120	65	40	60	30	35
Specific gravity		1.28		1.27	1.26		1.16	1.02
Permanent strain (%) *		26	24	27	25	27	25	1
Operating environment temperature (℃)		−20 ～+70					−5 ～+80	−20 ～+70
Embrittlement point (℃)		−70			−60	−45	−70	−50
Ignition point (℃)		400 ～ 500					350 ～ 450	300 ～ 400
Characteristics	Weather resistance	Each type has better weather resistance than ordinary rubber materials.						
	Water resistance	Can be used even if exposed to a small amount of water. (Cannot be used under conditions of constant water immersion.)						
	Oil resistance	Can be used even if exposed to a small amount of cutting oil. (Cannot be used under conditions of constant oil immersion.)						
	Discoloration	Becomes discolored when exposed to ultraviolet rays (including sunlight), however there is no adverse effect on performance. Relatively more discoloration occurs with urethane foams (porous) for high-deflection use than with other types.						
Features		・Provides the largest load resistance, for better contour forming. ・Because of the small deflection amount, this type can be used only for simple forming.	This type has physical properties intermediate between the H and S types, and can be used for general purposes.	Although the load resistance is lower, the larger deflection amount allows deeper forming.	Although the hardness is equivalent to general rubber materials, this type has superior abrasion resistance and mechanical strength.	Although the load resistance and durability (permanent strain) are somewhat inferior to the M type, the prices are lower.	・Can be used for high deflection (40%max.) and high load applications. ・The lateral expansion is about half that of the M type at an equivalent deflection. ・Because this type is foamed urethane, it provides excellent heat radiation performance.	With low permanent strain and excellent shock absorbing performance, this type can deliver anti-vibration performance.
Applications (reference)		Machining of thin stainless steel plates or steel plates approximately 2mm thick	Machining of thin plates of materials such as aluminum or brass	・Bulging ・Shallow drawing	・Drawing ・Guerin method ・Wheelon method	More suitable for small-volume production than the M type.	Often used as pad cushions and cam return cushions.	・Vibration proofing ・Machining of soft materials such as films.

The above figures are actual measurements at room temperature 23℃, and do not constitute guaranteed specifications.

＊method of measuring permanent strain (JIS K7312)

1) 24 hours at 70℃ with 25% compression
2) Cooled for 30 min. in laboratory at 23℃
3) Strain is measured.

Comparison of urethane springs, coil springs, and gas springs

◎: Excellent ○: Satisfactory △: Slightly poor ×: Unacceptable

Item	Cost to load ratio	Machinability	High speed endurance	Load stability	Permanent strain	Initial pressure	Operating environment temperatures
Urethane springs	◎	○	△	△	△	○	○
Coil springs	○	×	◎	◎	◎	△	◎
Gas springs	△	×	△	◎	◎	◎	△

[DATA] Relationship between compression ratio and strokes per minute

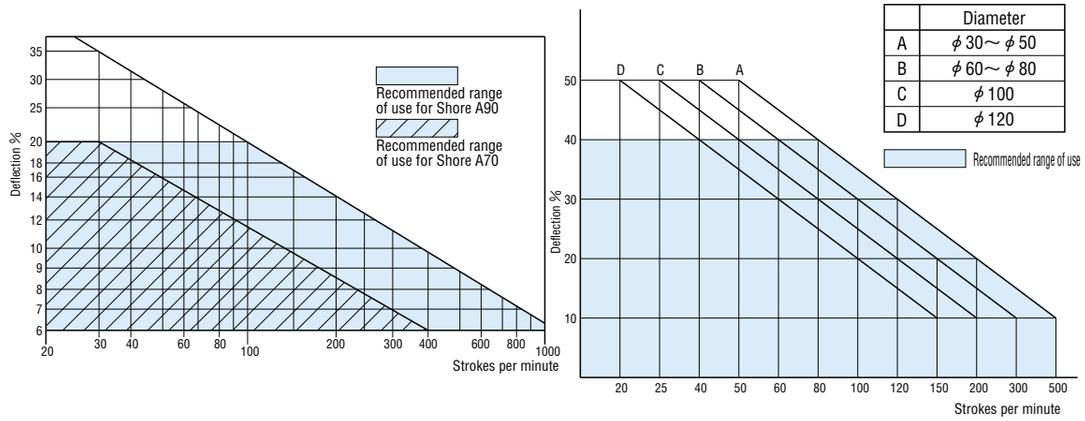
In order to control heat generation and accumulation and also to improve the endurance lifetime of the urethane spring, pay attention to the compression ratio and the strokes per minute. The following figures show the relationship between various compression ratios and allowable strokes per minute for maintaining good conditions for heat dissipation.

●Urethanes for heavy load and low repulsion urethanes Shore A70・90

When shore A70 and 90 urethanes deform, they generate heat through internal friction (hysteresis effect). This phenomenon occurs when the urethane is pressurized rapidly. When used for high-speed machining, heat will accumulate inside the urethane. Therefore it is necessary to adjust the deflection according to the strokes per minutes as shown in the table below.

●Urethane foams (porous) for high-deflection use

Urethane foams (porous) for high-deflection use produce less heat when compressed than urethanes for heavy loads. This is because the air bubbles inside the urethane deform first, reducing the deformation of the urethane itself. As a result, the lateral expansion due to compression is half that of urethanes for heavy loads, the heat accumulation is small, and the heat radiation performance is high. However in the same way as urethanes for heavy loads, special attention must be paid to the compression amount and stroke counts, as these can result in deterioration.



Urethane machining methods and precautions

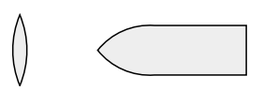
①Move the material (urethane) as rapidly as possible so that heat will not build up internally.

②Slow machining causes heating of the material (urethane), which results in elasticity loss, causing the saw teeth or cutter blade to become stuck in the material.

③It is important to use a blade that is as sharp and narrow as possible.

A. Cutting

1. Urethane can be easily cut with sawing machines, band saws, or other machines in the same way as steel.
2. When cutting with a lathe, operate the lathe at high speed with a sharp and narrow blade. (This is the best cutting method in terms of achieving good workpiece parallelism.)



B. Flattening

1. Urethane can be flattened by a milling cutter, shaper, or planer.
2. Cutting speed
   When using a milling machine, the cutter circumferential speed should be set to 40 ～ 60m/min. When using a shaper or planer, the speed should be set to the machine s highest speed.

C. Grinding

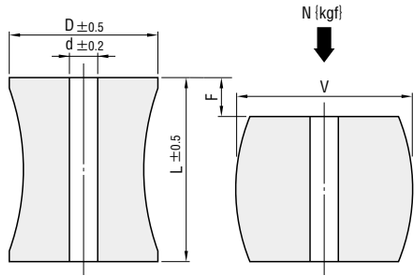
1. Use a cooling device while grinding, in the same way as when grinding steel. An appropriate grindstone circumferential speed is 80 ～ 100m/min.
2. The best grindstone material is GC with bonding strength K. The most suitable grain size is approximately 30 ～ 60.

D. Drilling

1. Drilling can be done in the same manner as with steel.
2. When the tip of the drill is shaped as shown below, better drilling can be accomplished without deforming the material (urethane).
3. The internal diameter of the drilled hole will shrink.

RoHS

EX



Product guide P.1501
Products data P.1517

H Shore A90

F=L×20% F mm	F=L×20% Load N {kgf}	F=L×25% F mm	F=L×25% Load N {kgf}	F=L×30% F mm	F=L×30% Load N {kgf}	V	D	d	L	Catalog No.	Base unit price 1~19 pieces
12	6865 {700}	15	8924 {910}	18	12749 {1300}	58	50	14	62	EX 5146	Quotation
16		20		24					82	EX 5148	
12	9807 {1000}	15	13239 {1350}	18	18633 {1900}	70	60	20	62	EX 6206	
16		20		24					82	EX 6208	
16	19123 {1950}	20	26478 {2700}	24	39227 {4000}	92	80	20	82	EX 8208	
20		25		30					103	EX 82010	
16	27949 {2850}	20	38736 {3950}	24	54427 {5550}	114	100	20	82	EX 10208	
20		25		30					103	EX 102010	
24		30		36					123	EX 102012	

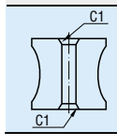
●Load {kgf} =Load {N}×0.101972

Order — Catalog No. EX 8208

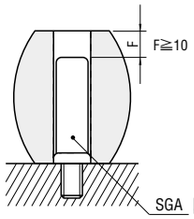
Days to Ship — Quotation

Price — Quotation

Alterations — Catalog No. — (C1) EX8208 — C1 Quotation

Alteration	Code	Spec.	1Code
	C1	C1 chamfering on inner diameter	Quotation

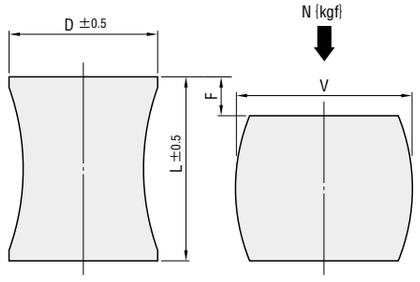
Example



SGA P.1437

RoHS

EX



Product guide P.1501
Products data P.1517

H Shore A90

F=L×20% F mm	F=L×20% Load N {kgf}	F=L×25% F mm	F=L×25% Load N {kgf}	F=L×30% F mm	F=L×30% Load N {kgf}	V	D	L	Catalog No.	Base unit price 1 ~ 19 pieces
12	7551 {770}	15	9807 {1000}	18	14710 {1500}	58	50	62	EX 5060	Quotation
16		20		24				82	EX 5080	
12	11082 {1130}	15	15004 {1530}	18	21575 {2200}	70	60	62	EX 6060	
16		20		24				82	EX 6080	
16	20104 {2050}	20	27753 {2830}	24	41188 {4200}	92	80	82	EX 8080	
20		25		30				103	EX 80100	
16	29420 {3000}	20	41188 {4200}	24	61292 {6250}	114	100	82	EX 10080	
20		25		30				103	EX 100100	
24		30		36				123	EX 100120	

●Load {kgf} =Load {N}×0.101972

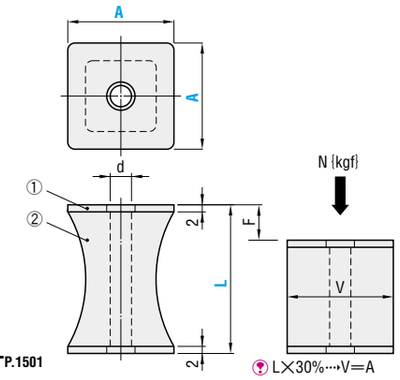
Order — Catalog No. EX100100

Days to Ship — Quotation

Price — Quotation

RoHS

QX



Product guide P.1501

L×30%···V=A

① M SS400
② M Urethane
H Shore A90

F=L×20% F mm	F=L×20% Load N {kgf}	F=L×25% F mm	F=L×25% Load N {kgf}	F=L×30% F mm	F=L×30% Load N {kgf}	d	Catalog No. Type	Catalog No. A—L		Base unit price 1 ~ 19 pieces
12	9807 {1000}	15	13239 {1350}	18	18633 {1900}	14	QX	60	62	Quotation
16		20		24					82	
12	13729 {1400}	15	18633 {1900}	18	25497 {2600}	20		70	62	
16		20		24					82	
18		23		27					92	
16	25497 {2600}	20	35304 {3600}	24	49033 {5000}			95	82	
20		25		30					103	
24		30		36					123	
20	39227 {4000}	25	53937 {5500}	30	73550 {7500}			120	103	
24		30		36					123	
28		35		42					143	

●Load {kgf} =Load {N} ×0.101972

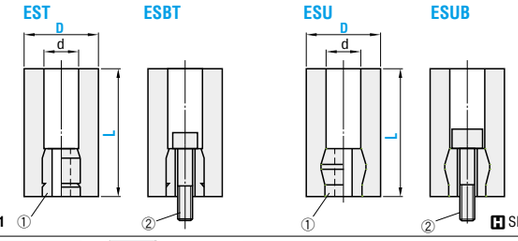
Order — Catalog No. QX 70—92

Days to Ship — Quotation

Price — Quotation

Urethane stock blocks

RoHS



Product guide P.1501

H Shore A90

d	Urethane	① EST·ESBT	① ESU·ESUB	②	Catalog No. Type	Catalog No. D—L	Base unit price 1 ~ 9 pieces EST·ESU	Base unit price 1 ~ 9 pieces ESBT·ESUB
14	E40—80	S14	SU14	CB8—45 (1 piece)	EST	＊ 40— 80	Quotation	
	E50—110				ESBT	50—110		
	E70—140				＊ESU	70—140		
22	E7022110	S22	SU22	CB12—55 (1 piece)	＊ESUB	＊ 7022110		
	E7022140					＊ 7022140		
	E90—120					90—120		
	E90—140					＊ 90—140		
	E100—140					100—140		

For ESU and ESUB, only the sizes marked with ＊ are available. Applicable urethanes P.1506

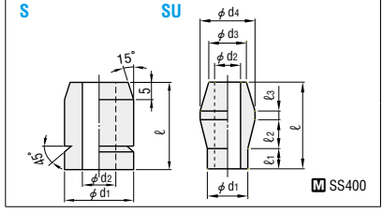
Order — Catalog No. EST 40—80

Days to Ship — Quotation

Price — Quotation

Sleeve unit

S SU



M SS400

d_1	d_2	d_3	d_4	ℓ	$ℓ_1$	$ℓ_2$	$ℓ_3$	Urethane d	Catalog No.	Base unit price 1 ~ 19 pieces
16	9	—	—	30	—	—	—	14	S14	Quotation
24	13	—	—	35	—	—	—	22	S22	
24	13	—	—	100	—	—	—	22 (L170 or more)	S22—100	
14	9	13	19	30	7	10	3	14	SU14	
22	13	20	27					22	SU22	

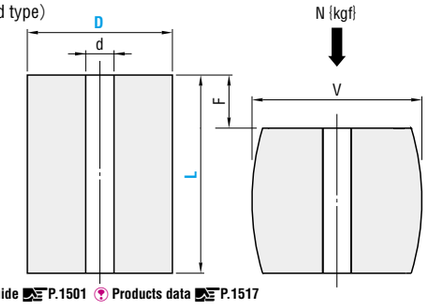
Order — Catalog No. S 14

Days to Ship — Quotation

Price — Quotation

RoHS

A (Standard type)



D	D T	d T	L T
15	±0.2	±0.2	±0.3
20			
25			
30			
40			
50	±0.3	±0.2	±0.5
60			
80	±0.4	±0.2	±0.5
100			

Product guide P.1501 Products data P.1517

H Shore A90

F=L×15% F mm	F=L×15% Load N {kgf}	F=L×20% F mm	F=L×20% Load N {kgf}	F=L×25% F mm	F=L×25% Load N {kgf}	F=L×25% V	d	Catalog No. Type D— L	Base unit price 1 ～ 19 pieces
3.8		5		6.3				A 15 — 25	
4.5	588	6	785	7.5	981	18	7	30	
5.3	{60}	7	{80}	8.8	{100}			35	
6		8		10				40	
3.8		5		6.3				A 20 — 25	
4.5	1128	6	1422	7.5	1765	24	8.5	30	
5.3	{115}	7	{145}	8.8	{180}			35	
6		8		10				40	
3.8		5		6.3				A 25 — 25	
4.5		6		7.5				30	
5.3	1667	7	2157	8.8	2648	30	11	35	
6	{170}	8	{220}	10	{270}			40	
6.8		9		11.3				45	
7.5		10		12.5				50	
3.8		5		6.3				A 30 — 25	
4.5		6		7.5				30	
5.3		7		8.8				35	
6	2599	8	3040	10	3531	37	14	40	
6.8	{265}	9	{310}	11.3	{360}			45	
7.5		10		12.5				50	
8.3		11		13.8				55	
9		12		15				60	
6	4560	8	5394	10	6276	48	14	A 40 — 40	
7.5	{465}	10	{550}	12.5	{640}			50	
9		12		15				60	
7.5	7747	10	9218	12.5	10787	60	14	A 50 — 50	
9	{790}	12	{940}	15	{1100}			60	
12		16		20				80	
7.5	13042	10	15102	12.5	17652	72	14	A 60 — 50	
9	{1330}	12	{1540}	15	{1800}			60	
12		16		20				80	
9	21378	12	25399	15	29420	95	22	A 80 — 60	
12	{2180}	16	{2590}	20	{3000}			80	
15		20		25				100	
12	35990	16	42659	20	49720	119	22	A100 — 80	
15	{3670}	20	{4350}	25	{5070}			100	
18		24		30				120	

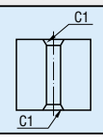
●Load {kgf} =Load {N}×0.101972

Order — Catalog No.: A 25—40

Days to Ship — Quotation

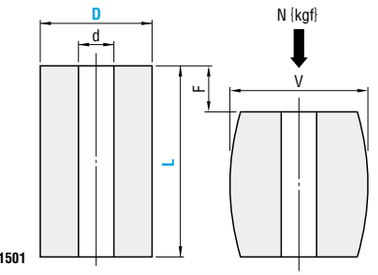
Price — Quotation

Alterations — Catalog No. — (C1): A 60—80 — C1 — Quotation

Alteration	Code	Spec.	1Code
	C1	C1 chamfering on inner diameter	Quotation

RoHS

E



D	D T	d T	L T
40	±0.2	±0.2	±0.3
50	±0.3	±0.2	±0.5
70			
90	±0.4	±0.2	±0.5
100			
110			

Product guide P.1501

H Shore A90

F=L×15% F mm	F=L×15% Load N {kgf}	F=L×20% F mm	F=L×20% Load N {kgf}	F=L×25% F mm	F=L×25% Load N {kgf}	F=L×25% V	D	d	L	Catalog No. Type	Catalog No. D— L	Base unit price 1 ～ 19 pieces
12	4560 {465}	16	5394 {550}	20	6276 { 640}	47	40		80		40— 80	
16.5	7747 {790}	22	9218 {940}	27.5	10787 {1100}	59	50		110		50—110	
16.5		22		27.5			70	14	110		70—110	
21		28		35			70		140		70—140	
25.5	18633	34	22555	42.5	24517	81	70		170		70—170	
16.5	{1900}	22	{2300}	27.5	{2500}		70		110		7022110	
21		28		35			70		140		7022140	
25.5		34		42.5			70		170	E	7022170	
21		28		35			90		140		90—140	
25.5	27459	34	33342	42.5	40207	105	90		170		90—170	
30	{2800}	40	{3400}	50	{4100}		90	22	200		90—200	
21	35990 {3670}	28	42659 {4350}	35	49720 {5070}	117	100		140		100—140	
21		28		35			110		140		110—140	
25.5	39226	34	47072	42.5	56878	129	110		170		110—170	
30	{4000}	40	{4800}	50	{5800}		110		200		110—200	
37.5		50		62.5			110		250		110—250	

●Load {kgf} =Load {N}×0.101972

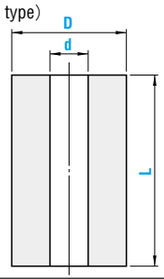
Order — Catalog No.: E 7022110

Price — Quotation

Days to Ship — Quotation

RoHS

EL (Configurable full length type)



D	D T	d T	L T
40	±0.2	±0.2	±0.3
50	±0.3	±0.2	±0.5
70			
90	±0.4	±0.2	±0.5
100			
110			

Product guide P.1501

H Shore A90

Catalog No. Type	D	d	L 1mm increments	Base unit price 1 ～ 9 pieces L15 ～ 20	L21 ～ 40	L41 ～ 60	L61 ～ 80	L81 ～ 100	L101 ～ 150	L151 ～ 200	L201 ～ 250
EL	40	14	15 ～ 200								
	50										
	70	14·22									
	90										
	100	22	50 ～ 250								
	110										

Order — Catalog No. — L: EL 70—22 — 155

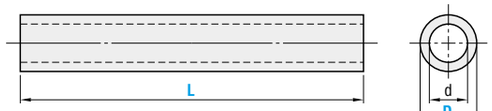
Price — Quotation

Days to Ship — Quotation

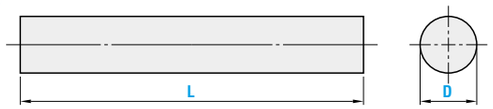
URETHANES FOR HEAVY LOAD

RoHS

LA



C



D	D T	d T
8	±0.2	—
10		
15		±0.2
20		
25		
30		
40		
50	±0.3	
60		
80	±0.4	
100		

Product guide P.1501

Shore A90

d	Catalog No. Type	D—L	Catalog No. Type	D—L	Base unit price 1 ～ 19 pieces
—	—		C	8—200	Quotation
—	—		C	10—200	
7	LA	15—200	C	15—200	
8.5	LA	20—200	C	20—200	
11	LA	25—200	C	25—200	
14	LA	30—500	C	30—500	
	LA	40—500	C	40—500	
	LA	50—500	C	50—500	
	LA	60—500	C	60—500	
22	LA	80—500	C	80—500	
	LA	100—500	C	100—500	

Order — Catalog No. LA 60—500

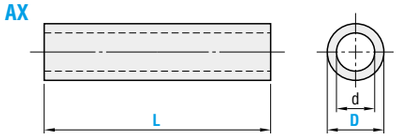
Days to Ship — Quotation

Price — Quotation

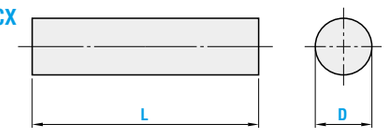
Configurable full length type

RoHS

AX



CX



D	D T	d T	L T
8	±0.2	—	±0.3
10			
15		±0.2	
20			
25			
30			
40			±0.5
50	±0.3		
60			
80	±0.4		
100			

Product guide P.1501

Shore A90

d	Catalog No.	D	L 1mm increments	Base unit price 1 ～ 19 pieces	L10 ～ 20	L21 ～ 40	L41 ～ 60	L61 ～ 80	L81 ～ 100	L101 ～ 150	L151 ～ 200
—	CX	8	10 ～ 200	Quotation							
—		10									
7	AX CX	15									
8.5		20									
11		25									
14		30									
		40									
		50									
		60									
22		80									
		100									

Order — Catalog No. D — L — AX 20 — 45

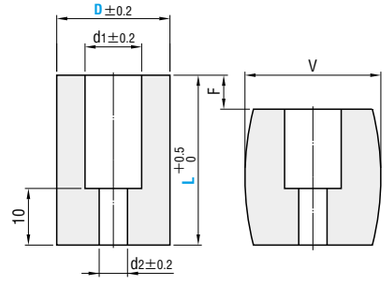
Days to Ship — Quotation

Price — Quotation

URETHANES WITH COUNTERBORE

RoHS

AZ (Standard type)



Product guide P.1501

Shore A90

F=L×10% F mm	Load N {kgf}	F=L×15% F mm	Load N {kgf}	F=L×20% F mm	Load N {kgf}	V	D	d1	d2	M	L	Catalog No. Type D—L	Base unit price 1 ～ 19 pieces
2.5	883 {90}	3.7	1079 {110}	5.0	1275 {130}	24	20	11	7	M6	25	AZ 20— 25	Quotation
3.0		4.5		6.0							30	30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
2.5	1177 {120}	3.7	1569 {160}	5.0	1765 {180}	29	25	11	7	M6	25	AZ 25— 25	
3.0		4.5		6.0							30	30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
3.0	2550 {260}	4.5	3040 {310}	6.0	3530 {360}	35	30	14	9	M8	30	AZ 30— 30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
3.0	4119 {420}	4.5	5099 {520}	6.0	5884 {600}	46	40	18	11	M10	30	AZ 40— 30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	

●Load {kgf} =Load {N}×0.101972

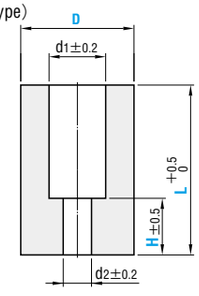
Order — Catalog No. AZ 20— 30

Days to Ship — Quotation

Price — Quotation

RoHS

AZX (Configurable full length type)



D	D T
25	±0.2
30	
40	
50	±0.3
60	
80	±0.4
100	

Product guide P.1501

Shore A90

Catalog No. Type	D	L 1mm increments	M	H 1mm increments
AZX	25	20 ～ 80	M 6 M 8	5≦H＜L
	30			
	40	25 ～ 150	M10 M12	
	50			
	60			
	80	25 ～ 200	M12 M16	
	100			

M	d1	d2
M 6	11	7
M 8	14	9
M10	18	11
M12	20	14
M16	26	18

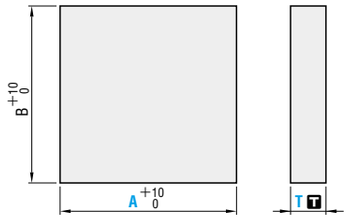
Order — Catalog No. — L — M — H — AZX 25 — 42 — M6 — 15

Days to Ship — Quotation

Price — Quotation

URETHANE SHEETS

UT



T	T
1 ～ 4	±0.3
5 ～ 10	±0.4
15 ～ 25	±0.5
30 ～ 50	±1

Product guide P.1501

Shore A90

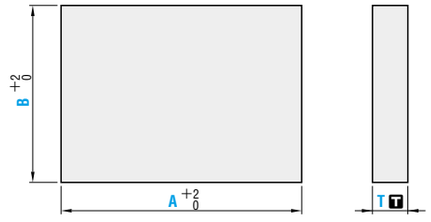
A	B	T	Catalog No. Type	T	—	A	Base unit price 1 ～ 9 pieces
300	300	5	UT	5	—	300	Quotation
		6		6	—	300	
		8		8	—	300	
		10		10	—	300	
		15		15	—	300	
		20		20	—	300	
		25		25	—	300	
		30		30	—	300	
500	500	1	UT	1	—	500	
		2		2	—	500	
		3		3	—	500	
		4		4	—	500	
		5		5	—	500	
		6		6	—	500	
		8		8	—	500	
		10		10	—	500	
		15		15	—	500	
		20		20	—	500	
		25		25	—	500	
		30		30	—	500	
		50		50	—	500	

Order — Catalog No.: UT 8—500

Days to Ship: Quotation

Price: Quotation

UTH (Configurable size type)



T	T
1 ～ 4	±0.3
5 ～ 10	±0.4
15 ～ 25	±0.5
30 ～ 50	±1

Product guide P.1501

Shore A90

Catalog No. Type	T	1mm increments A	B
UTH	1	20 ～ 500	20 ～ 500
	2		
	3		
	4		
	5		
	6		
	8		

Catalog No. Type	T	1mm increments A	B
UTH	10	20 ～ 500	20 ～ 500
	15		
	20		
	25		
	30		
	40		
	50		

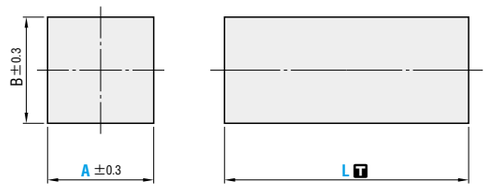
Order — Catalog No.: UTH 8 — 351 — 200

Days to Ship: Quotation

Price: Quotation

URETHANE DIE PADS

UD



Product guide P.1501

Shore A90

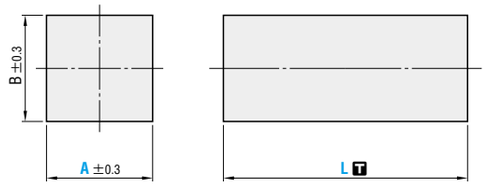
A	B	L	T	Catalog No. Type	A	—	L	Base unit price 1 ～ 9 pieces
25	25	50	±1	UD	25	—	50	Quotation
		100					100	
		300	+5 0				300	
		500					500	
		800					800	
		1000					1000	
50	50	50	±1	UD	50	—	50	
		100					100	
		300	+5 0				300	
		500					500	
		800					800	
		1000					1000	
75	50	50	±1	UD	75	—	50	
		100					100	
		300	+5 0				300	
		500					500	
		800					800	
		1000					1000	

Order — Catalog No.: UD 75—1000

Days to Ship: Quotation

Price: Quotation

UDH (Configurable full length type)



L	T
25 ～ 200	+1 0
201 ～ 500	+2 0
501 ～ 1000	+3 0

Product guide P.1501

Shore A90

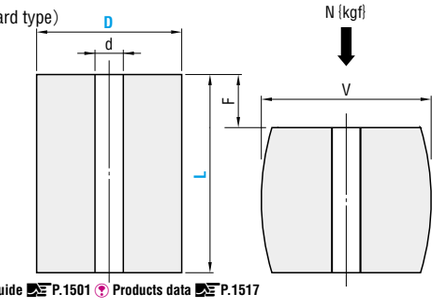
A	B	Catalog No. Type A	L 1mm increments	Base unit price 1 ～ 9 pieces
25	25	UDH 25	25 ～ 50	Quotation
			51 ～ 100	
			101 ～ 300	
			301 ～ 500	
			501 ～ 800	
			801 ～ 1000	
50	50	UDH 50	25 ～ 50	
			51 ～ 100	
			101 ～ 300	
			301 ～ 500	
			501 ～ 800	
			801 ～ 1000	
75	50	UDH 75	25 ～ 50	
			51 ～ 100	
			101 ～ 300	
			301 ～ 500	
			501 ～ 800	
			801 ～ 1000	

Order — Catalog No.: UDH 50 — L: 355

Days to Ship: Quotation

Price: Quotation

AE (Standard type)



D	D T	d T	L T
15	±0.2	±0.2	±0.3
20			
25			
30			
40			
50	±0.3		±0.5
60			

Product guide P.1501 Products data P.1517

Shore A90

F=L×15%		F=L×20%		F=L×25%			d	Catalog No.	Base unit price
F mm	Load N {kgf}	F mm	Load N {kgf}	F mm	Load N {kgf}	V		Type D — L	1 ～ 19 pieces
3.8	539 {55}	5	735 {75}	6.3	932 {95}	18	7	AE 15 — 25	
4.5		6		7.5				30	
5.3		7		8.8				35	
6		8		10				40	
3.8	1079 {110}	5	1373 {140}	6.3	1667 {170}	24	8.5	AE 20 — 25	
4.5		6		7.5				30	
5.3		7		8.8				35	
6		8		10				40	
3.8	1569 {160}	5	2059 {210}	6.3	2550 {260}	30	11	AE 25 — 25	
4.5		6		7.5				30	
5.3		7		8.8				35	
6		8		10				40	
6.8		9		11.3				45	
7.5		10		12.5				50	
4.5	2452 {250}	6	2844 {290}	7.5	3334 {340}	37	14	AE 30 — 30	
5.3		7		8.8				35	
6		8		10				40	
6.8		9		11.3				45	
7.5		10		12.5				50	
8.3		11		13.8				55	
9		12		15				60	
6	4315 {440}	8	5099 {520}	10	5982 {610}	48	14	AE 40 — 40	
7.5		10		12.5				50	
9		12		15				60	
7.5	7355 {750}	10	8728 {890}	12.5	10297 {1050}	60	14	AE 50 — 50	
9		12		15				60	
12		16		20				80	
7.5	12356 {1260}	10	14318 {1460}	12.5	16769 {1710}	72	14	AE 60 — 50	
9		12		15				60	
12		16		20				80	

Quotation

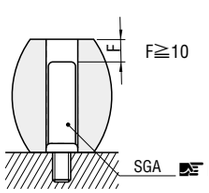
●Load {kgf} =Load {N}×0.101972

Order — Catalog No.: AE 15—25

Days to Ship: Quotation

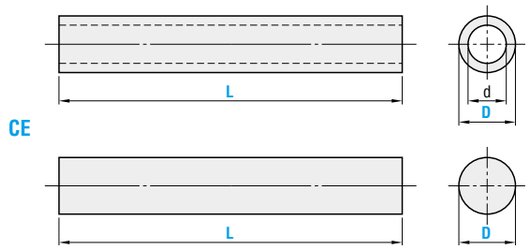
Price: Quotation

Example



SGA P.1437

LAE



CE

D	D T	d T
8	±0.2	—
10		±0.2
15		
20		
25		
30		
40		
50	±0.3	
60		

Product guide P.1501

Shore A90

d	Catalog No. Type	D—L	Catalog No. Type	D—L	Base unit price 1 ～ 19 pieces
—	—		CE	8—200	
—	—		CE	10—200	
7	LAE	15—200	CE	15—200	
8.5	LAE	20—200	CE	20—200	
11	LAE	25—200	CE	25—200	
14	LAE	30—500	CE	30—500	
	LAE	40—500	CE	40—500	
	LAE	50—500	CE	50—500	
	LAE	60—500	CE	60—500	

Quotation

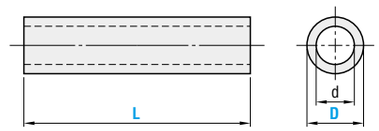
Order — Catalog No.: LAE 30—500

Days to Ship: Quotation

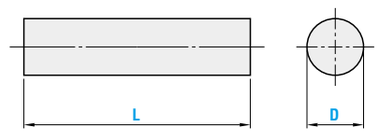
Price: Quotation

Configurable full length type

AEX



CEX



D	D T	d T	L T
8	±0.2	—	±0.3
10			
15		±0.2	
20			
25			
30			
40			
50	±0.3		±0.5
60			

Product guide P.1501

Shore A90

d	Catalog No.	D	L 1mm increments	Base unit price 1 ～ 19 pieces L10 ～ 20	L21 ～ 40	L41 ～ 60	L61 ～ 80	L81 ～ 100	L101 ～ 150	L151 ～ 200
—	CEX	8	10 ～ 200							
—		10								
7	AEX CEX	15								
8.5		20								
11		25								
14		30								
		40								
		50								
		60								

Quotation

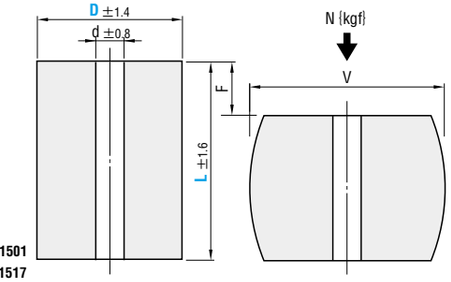
Order — Catalog No.: AEX | D: 20 | L: 52

Days to Ship: Quotation

Price: Quotation

RoHS

PA (Standard type)



Product guide P.1501
Products data P.1517
High-deflection type urethane springs become noticeably discolored when exposed to ultraviolet rays (including sunlight), however there is no adverse effect on performance.

F=L×20% F mm	F=L×20% Load N {kgf}	F=L×30% F mm	F=L×30% Load N {kgf}	F=L×40% F mm	F=L×40% Load N {kgf}	F=L×40% V	d	Catalog No. Type D — L	Base unit price 1 ~ 19 pieces
6	981 {100}	9	1177 {120}	12	1471 {150}	36	14	PA 30 — 30	Quotation
8		12		16				40	
8	1961 {200}	12	2452 {250}	16	3040 {310}	48		PA 40 — 40	
10		15		20				50	
12		18		24				60	
8		12		16				PA 50 — 40	
10	3481 {355}	15	4413 {450}	20	5541 {565}	60		50	
12		18		24				60	
16		24		32				80	
10		15		20				PA 60 — 50	
12	4609 {470}	18	5737 {585}	24	7257 {740}	72		60	
16		24		32				80	
20		30		40				100	
12		18		24				PA 80 — 60	
16	8532 {870}	24	10787 {1100}	32	13729 {1400}	96		80	
20		30		40				100	
26		39		52				130	
16		24		32			22	PA 100 — 80	
20	13925 {1420}	30	17652 {1800}	40	21771 {2220}	120		100	
24		36		48				120	
32		48		64				160	
16		24		32				PA 120 — 80	
20	19907 {2030}	30	24909 {2540}	40	30793 {3140}	144		100	
24		36		48				120	
32		48		64				160	

●Load {kgf} = Load {N} × 0.101972

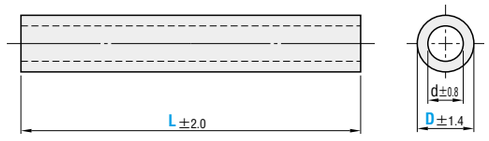
Order — Catalog No. PA 50—50

Days to Ship — Quotation

Price — Quotation

RoHS

PLA



Product guide P.1501
Please cut before using. P.1517
High-deflection type urethane springs become noticeably discolored when exposed to ultraviolet rays (including sunlight), however there is no adverse effect on performance.

d	Catalog No. Type D — L	Base unit price 1 ~ 19 pieces
14	PLA 30 — 200	Quotation
	PLA 40 — 200	
	PLA 50 — 200	
	PLA 60 — 200	
22	PLA 80 — 200	
	PLA 100 — 200	
	PLA 120 — 200	

Please cut before using.

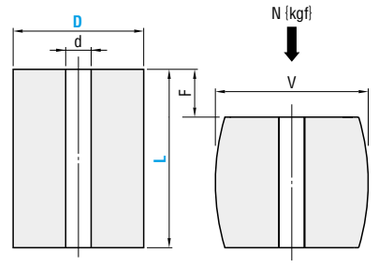
Order — Catalog No. PLA 80—200

Days to Ship — Quotation

Price — Quotation

RoHS

AN (Standard type)



D	D T	d T	L T
20	±0.2	±0.2	±0.3
25			
30			
40			
50	±0.3		±0.5
60			

Product guide P.1501
Products data P.1517
H Shore A70

F=L×15% F mm	F=L×15% Load N {kgf}	F=L×20% F mm	F=L×20% Load N {kgf}	F=L×25% F mm	F=L×25% Load N {kgf}	F=L×25% V	d	Catalog No. Type D — L	Base unit price 1 ~ 19 pieces
3.75		5		6.25				AN 20—25	
4.5	343 {35}	6	451 {46}	7.5	617 {63}	24	8.5	30	
5.25		7		8.75				35	
6		8		10				40	
3.75		5		6.25				AN 25—25	
4.5		6		7.5				30	
5.25	470 {48}	7	686 {70}	8.75	912 {93}	30	11	35	
6		8		10				40	
6.75		9		11.3				45	
7.5		10		12.5				50	
4.5		6		7.5				AN 30—30	
5.25		7		8.75				35	
6		8		10				40	
6.75	666 {68}	9	941 {96}	11.3	1245 {127}	37	14	45	
7.5		10		12.5				50	
8.3		11		13.8				55	
9		12		15				60	
6		8		10				AN 40—40	
7.5	1343 {137}	10	1914 {195}	12.5	2549 {260}	48	14	50	
9		12		15				60	
7.5		10		12.5				AN 50—50	
9	2081 {212}	12	2983 {304}	15	4028 {410}	59	14	60	
12		16		20				80	
7.5		10		12.5				AN 60—50	
9	3089 {315}	12	4481 {457}	15	5962 {608}	71	14	60	
12		16		20				80	

●Load {kgf} = Load {N} × 0.101972

Order — Catalog No. AN 25—40

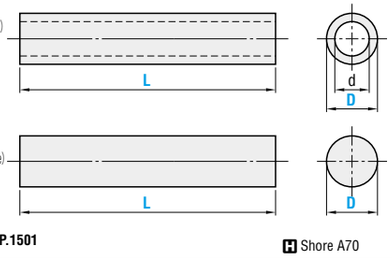
Days to Ship — Quotation

Price — Quotation

RoHS

LAN
ANX (Configurable full length type)

CNN
CNX (Configurable full length type)



●LAN ●CNN

D	D T	d T
20	±0.2	±0.2
25		
30		
40		
50	±0.3	
60		

●ANX ●CNX

D	D T	d T	L T
20	±0.2	±0.2	±0.3
25			
30			
40			
50	±0.3		±0.5
60			

Product guide P.1501
H Shore A70

d	Catalog No. Type	D — L	Base unit price 1 ~ 19 pieces
8.5	LAN	20—200	Quotation
11		25—200	
14		30—200	
	CNN	40—300	
		50—300	
		60—300	

d	Catalog No.	D	L 1mm increments	Base unit price 1 ~ 19 pieces: L10 ~ 20	L21 ~ 40	L41 ~ 60	L61 ~ 80	L81 ~ 100	L101 ~ 150	L151 ~ 200
8.5	ANX	20	10 ~ 200	Quotation						
11		25								
14	CNX	30								
		40								
		50								
		60								

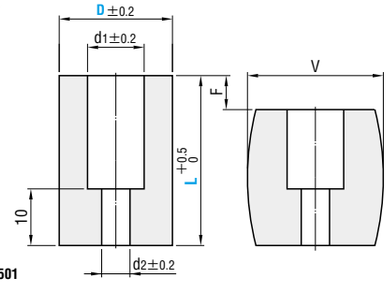
Order — Catalog No. LAN / ANX — D 60 — L 300 / D 20 — L 150

Days to Ship — Quotation

Price — Quotation

RoHS

AZN (Standard type)



Product guide P.1501

H Shore A70

F=L×10% F (mm)	F=L×10% Load N {kgf}	F=L×15% F (mm)	F=L×15% Load N {kgf}	F=L×20% F (mm)	F=L×20% Load N {kgf}	V	D	d1	d2	M	L	Catalog No. Type D — L	Base unit price 1 — 19 pieces
2.5	304 {31}	3.7	442 {45}	5.0	647 {66}	29	25	11	7	M6	25	AZN25 — 25	Quotation
3.0		4.5		6.0							30	30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
3.0	362 {37}	4.5	627 {64}	6.0	892 {91}	35	30	14	9	M8	30	AZN30 — 30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
3.0	735 {75}	4.5	1274 {130}	6.0	1814 {185}	46	40	18	11	M10	30	AZN40 — 30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
3.0	1117 {114}	4.5	1971 {201}	6.0	2824 {288}	57	50	20	14	M12	30	AZN50 — 30	
3.5		5.2		7.0							35	35	
4.0		6.0		8.0							40	40	
5.0		7.5		10.0							50	50	

●Load {kgf} =Load {N} ×0.101972

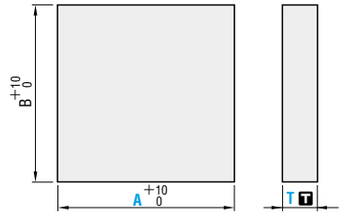
Order — Catalog No. AZN 25—30

Days to Ship — Quotation

Price — Quotation

RoHS

UTN (Urethane sheets)



T	T
5	±0.4
10	
15	±0.5
20	
25	
30	±1

Product guide P.1501

H Shore A70

A	B	T	Catalog No. Type T — A	Base unit price 1 ~ 9 pieces
250	250	5	UTN 5 — 250	Quotation
		10	10 — 250	
		15	15 — 250	
		20	20 — 250	
		25	25 — 250	
		30	30 — 250	

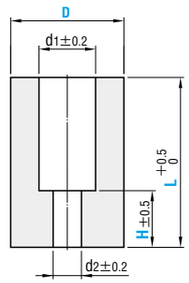
Order — Catalog No. UTN 25—250

Days to Ship — Quotation

Price — Quotation

RoHS

AZNX (Configurable full length type)



D	D T
25	±0.2
30	
40	
50	±0.3

Product guide P.1501

H Shore A70

Catalog No. Type	D	L 1mm increments	M	H 1mm increments
AZNX	25	20 ~ 60	M 6 M 8	5≦H<L
	30			
	40	25 ~ 100	M10 M12	
	50			

Tap M	M	M6	M8	M10	M12
	d1	11	14	18	20
	d2	7	9	11	14

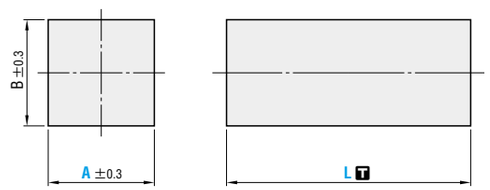
Order — Catalog No. — L — M — H — AZNX 25 — 42 — M6 — 15

Days to Ship — Quotation

Price — Quotation

RoHS

UDN (Urethane die pads)



Product guide P.1501

H Shore A70

A	B	L	T	Catalog No. Type A — L	Base unit price 1 ~ 9 pieces
25	25	50	±1	UDN 25 — 50	Quotation
		100		100	
		300	+5 0	300	
50	50	50	±1	UDN 50 — 50	
		100		100	
		300	+5 0	300	

Order — Catalog No. UDN 25—300

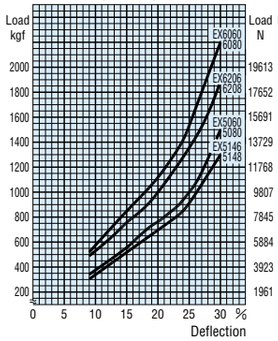
Days to Ship — Quotation

Price — Quotation

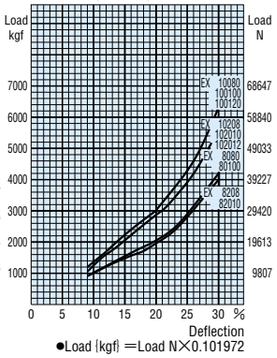
■Urethanes for heavy load（Shore A90）

・EX type

φ50・φ60



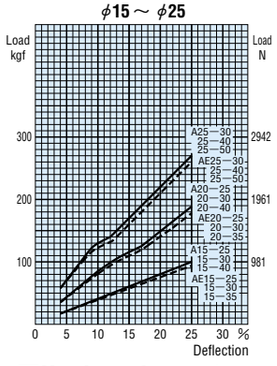
φ80・φ100



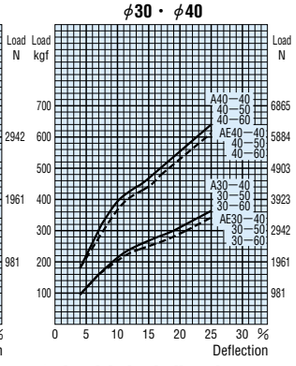
●Load {kgf} ＝Load N×0.101972

・A・AE type

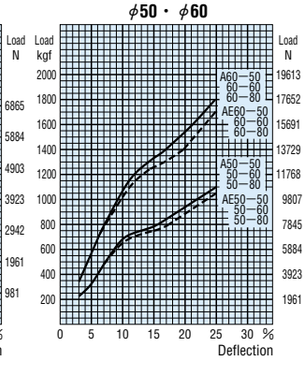
φ15～φ25



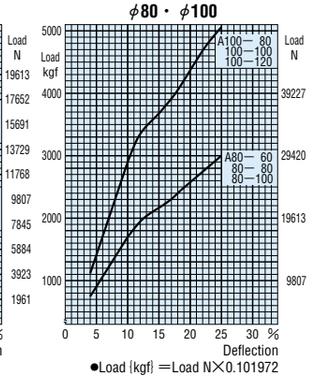
φ30・φ40



φ50・φ60



φ80・φ100

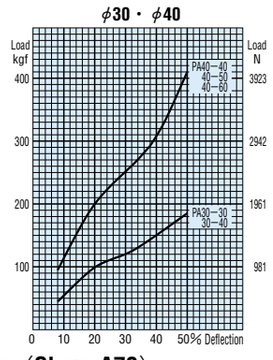


●Load {kgf} ＝Load N×0.101972

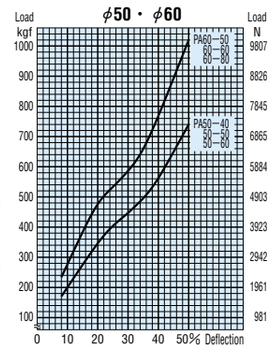
■Urethane foams（porous）for high-deflection use

・PA type

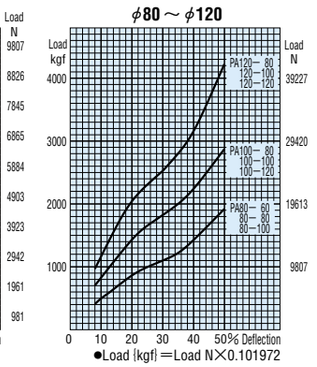
φ30・φ40



φ50・φ60



φ80～φ120

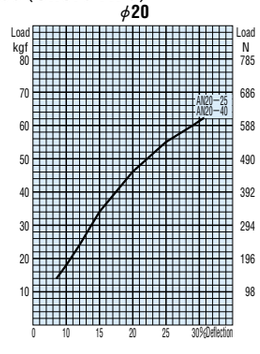


●Load {kgf} ＝Load N×0.101972

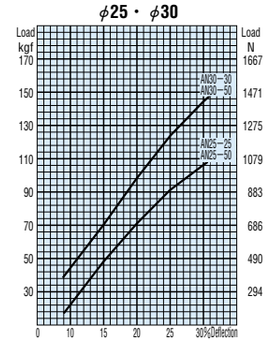
■Low repulsion urethanes（Shore A70）

・AN type

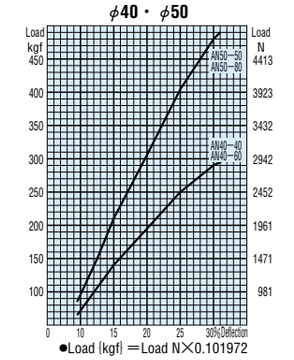
φ20



φ25・φ30



φ40・φ50



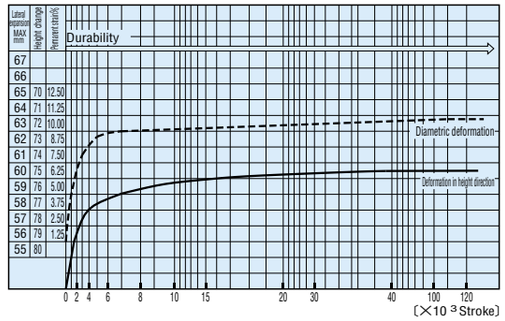
●Load {kgf} ＝Load N×0.101972

■Urethanes for heavy load（Shore A90）

・EX type

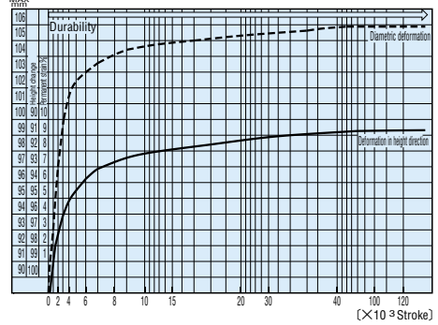
EX6080

（φ60×80L）Compression 30% 80SPM No lubrication



EX100100

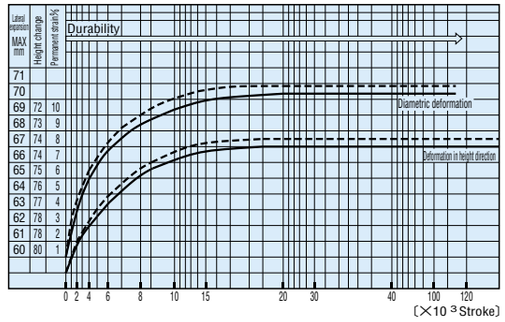
（φ100×100L）Compression 30% 80SPM No lubrication



・A・AE type

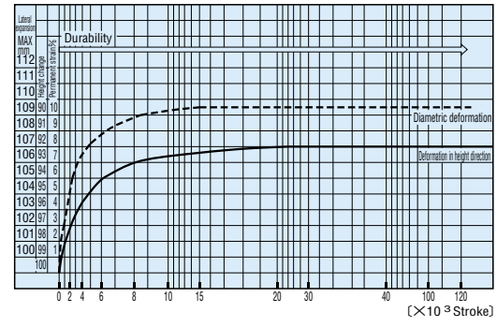
A60—80・AE60—80（—— A type, ---- AE type ）

（φ60×80L）Compression 25% 98SPM No lubrication



A100—100

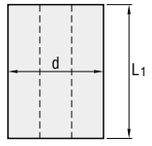
（φ100×100L）Compression 25% 45SPM No lubrication



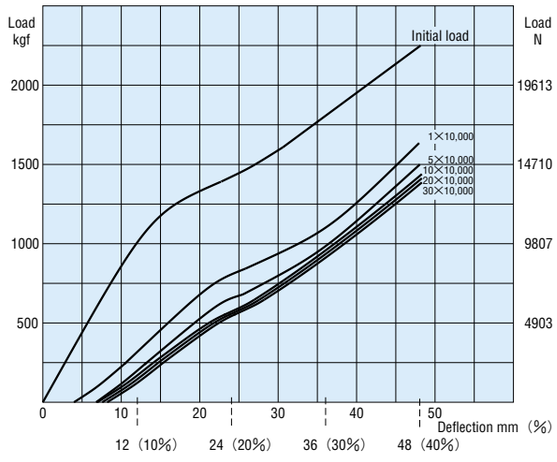
■Urethane foams（porous）for high-deflection use

・PA type

Load and full length changes according to the operation count



Operation count	Deflection=L×10%		Deflection=L×20%		Deflection=L×30%		Deflection=L×40%		L_1	d	Permanent strain mm
	Deflection mm	Load N {kgf}	Deflection mm	Load N {kgf}	Deflection mm	Load N {kgf}	Deflection mm	Load N {kgf}			
Initial	12	9611 {980}	24	13925 {1420}	36	17750 {1810}	48	22065 {2250}	120.0	101.1	—
10,000		3138 {320}		7845 {800}		10787 {1100}		16181 {1650}	115.8	104.9	4.2
50,000		1961 {200}		6423 {655}		9512 {970}		14612 {1490}	113.3	105.8	6.7
100,000		1569 {160}		5688 {580}		8973 {915}		14024 {1430}	112.5	106.7	7.5
200,000		1373 {140}		5492 {560}		8826 {900}		13925 {1420}	112.2	106.7	7.8
300,000		1177 {120}		5296 {540}		8777 {895}		13827 {1410}	112.0	106.7	8.0

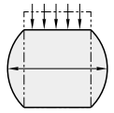


● Load {kgf} ＝Load N×0.101972

[PRODUCTS DATA] CALCULATING URETHANE LOAD CHARACTERISTICS

If urethane is used as a pressure medium, it is extremely important to know how much deflection will be caused at a given load. Especially in a limited space, it is necessary to design a die with appropriate considerations for load and deformation. The shape coefficient and elastic modulus are necessary for determining the load and the amount of deflection.
One characteristic of urethane springs is that, regardless of the shape, they expand on both sides when load is applied. This does not change its overall volume; however this bulging caused by load application must be taken into consideration when designing a die. (Figure 1)

(Figure 1)



●Shape change and load

A. Shape coefficient

The shape coefficient is defined mathematically as the surface area of one load bearing surface divided by the surface area of all the sides not directly subjected to the load.

$$\text{Shape coefficient (SF)} = \frac{\text{Area of load bearing surface } (S_1)}{\text{Area of all other sides } (S_2)}$$

Different calculation methods must be used for block shapes and pillar (cylinder) shapes.
(See Figure 2.)

a) Block shapes

$$SF = \frac{L \times W}{2H(L+W)} \cdots\cdots (1)$$

b) Pillar shapes

$$SF = \frac{\pi D^2}{4\pi DH} = \frac{D}{4H} \cdots\cdots (2)$$

π : Circular constant = 3.14

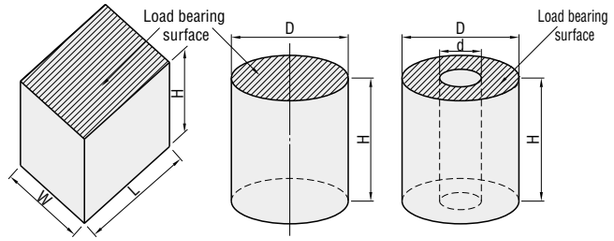
c) Cylinder shapes

$$SF = \frac{D-d}{4H} \cdots\cdots (3)$$

However the following conditions must be met in order to apply these formulas.

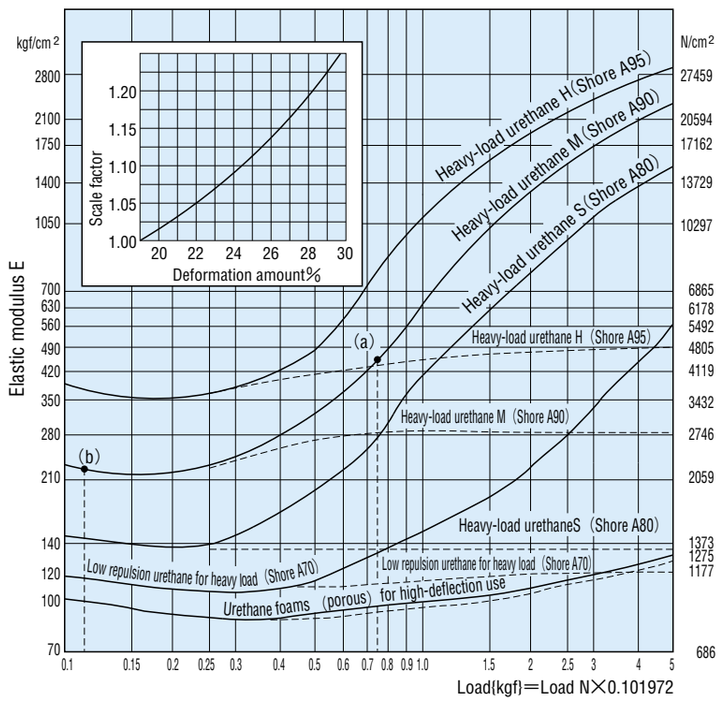
①The load must be applied straight (not at an angle) and in a direction parallel to the axis.
②The width, length, and diameter of the load bearing surface must exceed half of the length or thickness.

(**Figure 2**)



a) Block shapes　b) Pillar shapes　c) Cylinder shapes

(**Chart 1**) **Relationship between elastic modulus and shape coefficient (numeric values)** ——— No lubrication ----- Lubrication



If the deformation rate is 20% or more, the scale factor must be considered.

B. Elastic modulus

The elastic modulus (E) is defined as the force (stress) per unit area divided by the percentage of height deformation (distortion). From Chart 1, it can be seen that under non-lubricated conditions, the elastic modulus changes greatly depending on the shape coefficient.
Under the two conditions listed above, the elastic modulus (E) can be determined as shown below.

$$\text{Elastic modulus (E)} = \frac{F/S}{\Delta H/H} \cdots\cdots (4)$$

(F: Load, S: Load bearing surface area, ΔH: Height change, H: Initial height (free height))

C. Load and change amount

The load can be determined by using Formula (4).

$$\text{Load (F)} = \frac{\Delta H \times S \times E}{H} \cdots\cdots (5)$$

The amount of change in height can also be determined in the same way.

$$\text{Height change } (\Delta H) = \frac{F \times H}{S \times E} \cdots\cdots (6)$$

[**Example 1**]
Suppose that the length L is 100mm, the width W 80mm and the height H 30mm. At that time, how much force is required to change the urethane thickness by 5mm? (Conditions: Heavy load urethane M, no lubrication) (1cm=10mm)

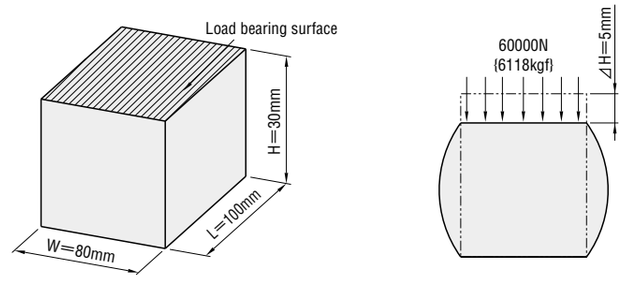
First, consider the shape coefficient (SF). From Formula (1):

$$\text{Shape coefficient (SF)} = \frac{L \times W}{2H(L+W)} = \frac{10 \times 8}{2 \times 3 \times (10+8)} = \frac{80}{108} = 0.74$$

Using Chart 1, find the intersecting point (a) between the curve for heavy load urethane M and SF=0.74. The obtained elastic modulus (E) is approximately 4,500N/cm^2 {459kgf}. From Formula (5), the load is calculated as follows.

$$\text{Load (F)} = \frac{\Delta H \times S \times E}{H} = \frac{\Delta H \times L \times W \times E}{H} = \frac{0.5\,[\text{cm}] \times 80\,[\text{cm}^2] \times 4{,}500\,[\text{N/cm}^2]}{3\text{cm}} = 60{,}000\text{N } \{6{,}118\text{kgf}\}$$

Therefore, to change the urethane height by 5mm, a force of 60,000N {6,118kgf} is necessary.



[**Example 2**]
When a force of 10,000N {1,020kgf} is applied to a urethane pillar with diameter D of 50mm and height H of 100mm, how much does the urethane height change? (Conditions: Heavy-load urethane M, no lubrication) (1cm=10mm)

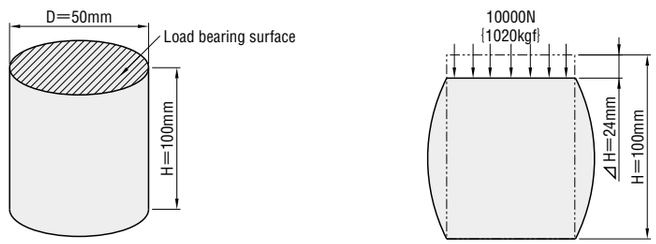
First, determine the shape coefficient (SF) by using Formula (2),

$$\text{Shape coefficient (SF)} = \frac{D}{4H} = \frac{5}{4 \times 10} = 0.125$$

Using Chart 1, find the intersecting point (b) between the curve for heavy load urethane M and SF=0.125. The obtained elastic modulus (E) is approximately 2,100N/cm^2 {214kgf}. From Formula (6), the height change (ΔH) is calculated as follows.

$$\text{Height change } (\Delta H) = \frac{F \times H}{S \times E} = \frac{F \times H}{\pi \times \left(\frac{D}{2}\right)^2 \times E} = \frac{4F \times H}{\pi E D^2} = \frac{4 \times 10{,}000\,[\text{N}] \times 10\,[\text{cm}]}{3.14 \times 2{,}100\,[\text{N/cm}^2] \times 5^2\,[\text{cm}^2]} = 2.4\text{cm}$$

Therefore, when a load of 10,000N {1020kgf} is applied, the urethane height change is 24mm.



Note: The calculated numerical values should be used only for reference.