

# Urethane Washers

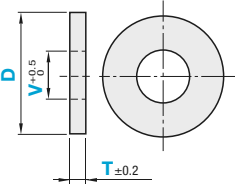
Standard, Antistatic, Heat Resistant, Vulkollan®, Abrasion Resistant, Ceramic Urethane, Adhesive

Adhesive Type is convenient for temporary fixing.

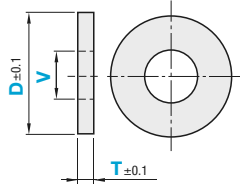


RoHS

### Standard Grade



### Precision Grade



For Vulkollan®, see the tolerance table.

The tolerances are verified at 23°C±2 and 40~80% humidity.

Standard Grade Tolerance

D Tolerance	D Tolerance	T Tolerance	V Tolerance
D	D	T	V
6~40 ±0.2	6~40 ±0.5	3~5 ±0.5	2~50 +0.1
41~60 ±0.3	41~60 ±0.6	5.5~10 ±0.2	51~80 +0.2
61~100 ±0.4	61~100 ±0.7		

For Vulkollan®, see the table on the right.

Precision Grade Tolerance

D Tolerance	V Tolerance
D	V
6~40 ±0.5	2~50 +0.1
41~60 ±0.6	51~80 +0.2
61~100 ±0.7	

Type	Standard Grade	Precision Grade	Material	Hardness	Photo No., Color
Standard	URWS	UAWS	Standard Urethane	Shore A95	① Natural Color
	URWH	UAWH	(Ether Polyurethane)	Shore A90	
	URWM	UAWM	Standard Urethane (Ester Polyurethane)	Shore A70	
	URWL		Standard Urethane (Ester Polyurethane)	Shore A50	③ Brown
	URHWH		Heat Resistant Urethane	Shore A90	
	UREWH		Abrasion Resistant Urethane	Shore A90	
Configurable Type	URFS	UAFSN	Standard Urethane	Shore A95	① Natural Color
	URFH	UAFH	(Ether Polyurethane)	Shore A90	
	URFM	UAFM	Standard Urethane (Ester Polyurethane)	Shore A70	
	URFL		Standard Urethane (Ester Polyurethane)	Shore A50	② Gray
	URFY		Standard Urethane (Ester Polyurethane)	Shore A30	
	URFHE		Antistatic Polyurethane	Shore A90	
	URFME		Antistatic Polyurethane	Shore A70	③ Brown
	URFLE		Antistatic Polyurethane	Shore A50	
	URHFH		Heat Resistant Urethane	Shore A90	
	VULFH		Super Abrasion Resistant Urethane Vulkollan®	Shore A92	⑤ Beige
	VULFM		Super Abrasion Resistant Urethane Vulkollan®	Shore A68	
	UREFH		Abrasion Resistant Urethane	Shore A90	
	UREFM		Abrasion Resistant Urethane	Shore A70	⑥ Gray
	URCES		Ceramic Urethane	Shore A95	
	URCEH		Ceramic Urethane	Shore A90	
URCEM		Ceramic Urethane	Shore A70		

For features of Ceramic Urethane, see P.389.

Urethane turns yellow by aging, but physical property or characteristics remain unchanged.

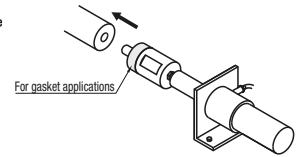
For Yellow Discoloration of Urethane, see P.392.

### Characteristic Values of Antistatic Urethane

Specific Volume Resistivity	2.1x10 <sup>10</sup> Ω·cm
Surface Resistivity	4.0x10 <sup>9</sup> Ω

(Conditions: Temperature 30°C Humidity 60%)

All other properties are equal to those of urethane of the same hardness.



### Standard

For economical packages, see P.392. (Note that tolerances etc. are different.)

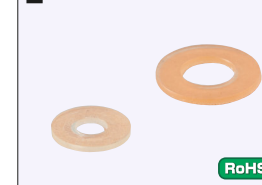
Standard / Precision	Material	Hardness (Shore A)	Unit Price								
			Standard Grade						Precision Grade		
			Standard Urethane			Heat Resistant/Abrasion Resistant Urethane			Standard Urethane		
Part Number	D	95	90	70	50	90	90	70	95	90	70
Type	D	URWS	URWH	URWM	URWL	URHWH	UREWH	UREWM	UAWS	UAWH	UAWM
Standard Grade											
URWS (Standard Shore A95)	6										
URWH (Standard Shore A90)	8										
URWM (Standard Shore A70)	10										
URWL (Standard Shore A50)	12										
URHWH (Heat Resistant Shore A90)	15										
UREWH (Abrasion Resistant Shore A90)	20										
UREWM (Abrasion Resistant Shore A70)	25										
Precision Grade											
UAWS (Standard Shore A95)	30										
UAWH (Standard Shore A90)	35										
UAWM (Standard Shore A70)	40										
	50										
	60										

### Configurable Type

Standard / Precision	Material	Hardness (Shore A)	Unit Price																		
			Standard Urethane						Antistatic Polyurethane			Heat Resistant/Vulkollan®			Abrasion Resistant Urethane			Ceramic Urethane			
			Standard Urethane			Antistatic Polyurethane			Heat Resistant/Vulkollan®			Abrasion Resistant Urethane			Ceramic Urethane						
Part Number	D	T	95	90	70	50	30	90	70	50	92	68	90	70	95	90	70	95	90	70	
Type	D	T	URFS	URFH	URFM	URFL	URFY	URFHE	URFME	URFLE	URHFH	VULFH	VULFM	UREFH	UREFM	URCES	URCEH	URCEM	UAFSN	UAFH	UAFM
Standard Grade																					
6~15	1.0~5.0																				
16~30	5.5~10.0																				
31~45	1.0~5.0																				
46~60	5.5~10.0																				
61~80	1.0~5.0																				
81~100	5.5~10.0																				

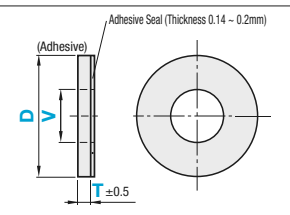
Adhesive Type Washers convenient for temporary fixing.

### Urethane Washers - Adhesive



Type	Type	Material	Hardness	Color
Urethane Washers - Adhesive	URWHS	Standard Urethane (Ether Polyurethane)	Shore A90	Natural Color
	URWMS	Standard Urethane (Ester Polyurethane)	Shore A70	

Temperature limit for seals is 80°C.



### Standard

Part Number	D	V Selection				T Selection		
		6	8	10	12	1	2	3
Standard Grade								
URWS (Standard Shore A95)	6	2				1	2	3
URWH (Standard Shore A90)	8	2	3	4		1	2	3
URWM (Standard Shore A70)	10		3	4	5	6		
URWL (Standard Shore A50)	12			4	5	6	8	
URHWH (Heat Resistant Shore A90)	15				4	5	6	8
UREWH (Abrasion Resistant Shore A90)	20					5	6	8
UREWM (Abrasion Resistant Shore A70)	25						5	6
Precision Grade								
UAWS (Standard Shore A95)	30						5	6
UAWH (Standard Shore A90)	35						8	10
UAWM (Standard Shore A70)	40							8
	50							8
	60							12

### Configurable Type

Part Number	D	V	T
Standard Grade			
URFS (Standard Urethane Shore A95)	6~15		1.0~5.0
URFH (Standard Urethane Shore A90)		0 (No Hole)	5.5~10.0
URFM (Standard Urethane Shore A70)	16~30	2~41 (V≤D-4)	1.0~5.0
URFL (Standard Urethane Shore A50)			5.5~10.0
URFY (Standard Urethane Shore A30)	31~45		1.0~5.0
URFHE (Antistatic Polyurethane Shore A90)			5.5~10.0
URFME (Antistatic Polyurethane Shore A70)	46~60	0 (No Hole)	1.0~5.0
URFLE (Antistatic Polyurethane Shore A50)		10~70 (V≤D-4)	5.5~10.0
	61~80		1.0~5.0
			5.5~10.0
Precision Grade			
UAFSN (Standard Urethane Shore A95)	81~100	0 (No Hole)	1.0~5.0
UAFH (Standard Urethane Shore A90)		20~80 (V≤D-4)	
UAFM (Standard Urethane Shore A70)			5.5~10.0

When V=0, there is no hole. Vulkollan® is available for T=3.0 or more. For Ceramic Urethane, T=5.0 or more.

Ordering Example

Standard	Part Number	-	V	-	T
	URWL20	-	10	-	5

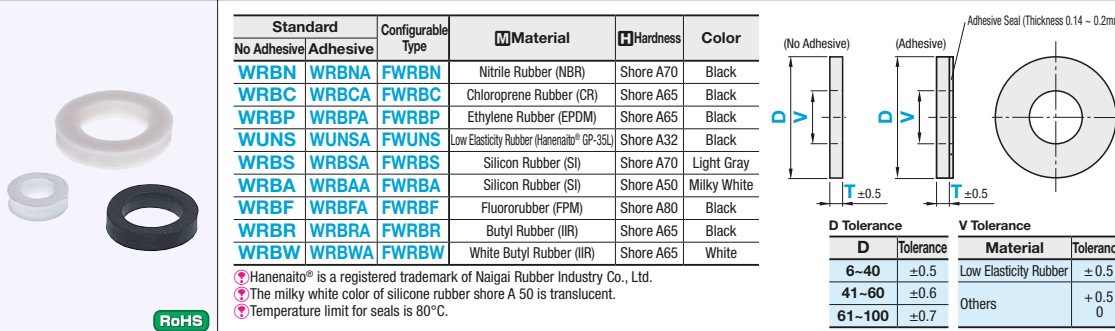
Ordering Example

Configurable Type	Part Number	-	D	-	V	-	T
	URFM	-	D19	-	V3	-	T4.5
	URFH	-	D35	-	V18	-	T8.0

Ordering Example

Part Number	-	V	-	T
URWHS20	-	10	-	5

# Rubber Washers



Standard		Configurable Type	Material	Hardness	Color
No Adhesive	Adhesive				
WRBN	WRBNA	FWRBN	Nitrile Rubber (NBR)	Shore A70	Black
WRBC	WRBCA	FWRBC	Chloroprene Rubber (CR)	Shore A65	Black
WRBP	WRBPA	FWRBP	Ethylene Rubber (EPDM)	Shore A65	Black
WUNS	WUNSA	FWUNS	Low Elasticity Rubber (Hanenaito® GP-35L)	Shore A32	Black
WRBS	WRBSA	FWRBS	Silicon Rubber (SI)	Shore A70	Light Gray
WRBA	WRBAA	FWRBA	Silicon Rubber (SI)	Shore A50	Milky White
WRBF	WRBFA	FWRBF	Fluororubber (FPM)	Shore A80	Black
WRBR	WRBRA	FWRBR	Butyl Rubber (IIR)	Shore A65	Black
WRBW	WRBWA	FWRBW	White Butyl Rubber (IIR)	Shore A65	White

Ⓜ Hanenaito® is a registered trademark of Naigai Rubber Industry Co., Ltd.  
 Ⓜ The milky white color of silicone rubber shore A 50 is translucent.  
 Ⓜ Temperature limit for seals is 80°C.

D Tolerance		V Tolerance	
D	Tolerance	Material	Tolerance
6-40	±0.5	Low Elasticity Rubber	±0.5
41-60	±0.6	Others	+0.5
61-100	±0.7		0

## Rubber Washer Standard Type (No Adhesive)

Part Number Type	D	V Selection	T Selection	Unit Price								
				WRBN	WRBC	WRBP	WUNS	WRBS	WRBA	WRBF	WRBR	WRBW
WRBN	6	2	1 2 3									
WRBC	8	2 3 4	1 2 3									
WRBP	10	3 4 5 6	1 2 3 5									
WUNS	12	4 5 6 8	1 2 3 5									
WRBS	15	4 5 6 8 10	1 2 3 5									
WRBA	20	5 6 8 10 12	3 5									
WRBF	25	5 6 8 10 12 16 20	3 5									
WRBR	30	5 6 8 10 12 16 20	3 5									
WRBW	35	8 10 12 16 20 25	5									
	40	8 10 12 16 20 25 30	5									
	50	8 10 12 16 20 25 30	5									
	60	12 16 20 25 30 40	5									

## Rubber Washer Standard Type (Adhesive)

Part Number Type	D	V Selection	T Selection	Unit Price								
				WRBNA	WRBCA	WRBPA	WUNSA	WRBSA	WRBAA	WRBFA	WRBRA	WRBWA
WRBNA	6	2	1 2 3									
WRBCA	8	2 3 4	1 2 3									
WRBPA	10	3 4 5 6	1 2 3 5									
WUNSA	12	4 5 6 8	1 2 3 5									
WRBSA	15	4 5 6 8 10	1 2 3 5									
WRBAA	20	5 6 8 10 12	3 5									
WRBFA	25	5 6 8 10 12 16 20	3 5									
WRBRA	30	5 6 8 10 12 16 20	3 5									
WRBWA	35	8 10 12 16 20 25	5									
	40	8 10 12 16 20 25 30	5									
	50	8 10 12 16 20 25 30	5									
	60	12 16 20 25 30 40	5									

## Rubber Washer Configurable Type (No Adhesive)

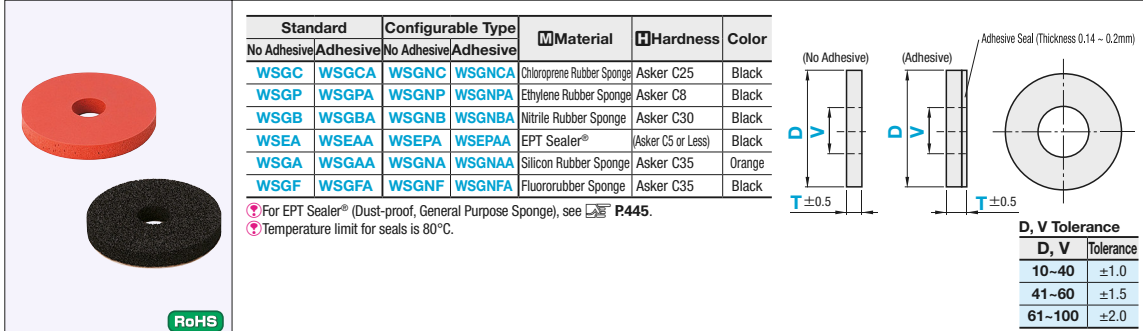
Part Number Type	D	V	T	Unit Price								
				FWRBN	FWRBC	FWRBP	FWUNS	FWRBS	FWRBA	FWRBF	FWRBR	FWRBW
FWRBN	6-15	0 (No Hole) 2-39 (V<D-6)	1-5									
FWRBC	16-30		6-10									
FWRBP	31-45		1-5									
FWUNS	46-60	0 (No Hole) 10-70 (V<D-6)	6-10									
FWRBS			1-5									
FWRBA	61-80	0 (No Hole) 20-80 (V<D-6)	6-10									
FWRBF			1-5									
FWRBR	81-100	0 (No Hole) 20-80 (V<D-6)	6-10									
FWRBW			1-5									
			6-10									

Ⓜ When V=0, there is no hole.

Ordering Example  
**Standard**  
 Part Number - V - T  
 WUNS20 - 10 - 5

Ordering Example  
**Configurable Type**  
 Part Number - D - V - T  
 FWUNS - D19 - V3 - T5

# Sponge Washers



Standard		Configurable Type	Material	Hardness	Color	
No Adhesive	Adhesive	No Adhesive	Adhesive			
WSGC	WSGCA	WSGNC	WSGNCA	Chloroprene Rubber Sponge	Asker C25	Black
WSGP	WSGPA	WSGNP	WSGNPA	Ethylene Rubber Sponge	Asker C8	Black
WSGB	WSGBA	WSGNB	WSGNBA	Nitrile Rubber Sponge	Asker C30	Black
WSEA	WSEAA	WSEPA	WSEPAA	EPT Sealer®	(Asker C5 or Less)	Black
WSGA	WSGAA	WSGNA	WSGNAA	Silicon Rubber Sponge	Asker C35	Orange
WSGF	WSGFA	WSGNF	WSGNFA	Fluororubber Sponge	Asker C35	Black

Ⓜ For EPT Sealer® (Dust-proof, General Purpose Sponge), see P.445.  
 Ⓜ Temperature limit for seals is 80°C.

D, V Tolerance	
D, V	Tolerance
10-40	±1.0
41-60	±1.5
61-100	±2.0

## Standard Type (No Adhesive)

Part Number Type	D	V Selection	T Selection	Unit Price						
				WSGC	WSGP	WSGB	WSEA	WSGA	WSGF	
WSGC	6	2	3							
WSGP	8	2 3 4	3							
WSGB	10	3 4 5 6	3 5							
WSEA	12	4 5 6 8	3 5							
WSGA	15	4 5 6 8 10	3 5							
WSGF	20	5 6 8 10 12	3 5 10							
	25	5 6 8 10 12 16 20	3 5 10							
	30	5 6 8 10 12 16 20	3 5 10							
	35	8 10 12 16 20 25	5 10							
	40	8 10 12 16 20 25 30	5 10							
	50	8 10 12 16 20 25 30	5 10							
	60	12 16 20 25 30 40	5 10							

## Standard Type (Adhesive)

Part Number Type	D	V Selection	T Selection	Unit Price						
				WSGCA	WSGPA	WSGBA	WSEAA	WSGAA	WSGFA	
WSGCA	6	2	3							
WSGPA	8	2 3 4	3							
WSGBA	10	3 4 5 6	3 5							
WSEAA	12	4 5 6 8	3 5							
WSGAA	15	4 5 6 8 10	3 5							
WSGFA	20	5 6 8 10 12	3 5 10							
	25	5 6 8 10 12 16 20	3 5 10							
	30	5 6 8 10 12 16 20	3 5 10							
	35	8 10 12 16 20 25	5 10							
	40	8 10 12 16 20 25 30	5 10							
	50	8 10 12 16 20 25 30	5 10							
	60	12 16 20 25 30 40	5 10							

## Configurable Type

The unit price of Configurable Type "No Adhesive" is shown in the table below.

Part Number Type (xMaterial Multiplier)	T	T Tolerance	D 1mm Increment	V 1mm Increment	Unit Price					
					D10-20	D21-40	D41-60	D61-80	D81-100	
WSGNC (x1.0) WSGNP (x1.0) WSGNB (x1.0) WSEPA (x1.0)	3	±0.5	10-100	0 (No Hole) 5-80 Ⓜ When D≤40, D-V≥5 When D>40, D-V≥8						
	5									
	8									
	10									
WSGNA (x1.0) WSGNAA (x1.2)	3	±0.5								
	5									
	8									
WSGNF (x1.0) WSGNFA (x1.2)	2	±0.5								
	3									
	5									
	10	±1.5								

Ordering Example  
**Standard**  
 Part Number - V - T  
 WSGPA15 - 6 - 5

Ordering Example  
**Configurable Type**  
 Part Number - D - V  
 WSGNA3 - D12 - V6





# Bumpers with Metal Washer

Urethane, Antistatic Polyurethane, Rubber

MISUMI original product. Baked Metal Washer, Urethane and Rubber.

L Selectable	L Configurable	Urethane, Rubbers			Washer Material
		M Material	Color	H Hardness	
AYSK	AYFS	Ether Type Polyurethane	Black	Shore A95	EN 1.4301 Equiv.
AYHK	AYFH			Shore A90	
AYMK	AYFM			Shore A70	
AYLK	AYFL	Ester Type Polyurethane	Black	Shore A50	
-	AYFY			Shore A30	
-	AYFHE			Shore A90	
-	AYFME	Antistatic Polyurethane	Gray	Shore A70	
-	AYFLE			Shore A50	
-	RBFN	Nitrile Rubber (NBR)	Black	Shore A70	
-	RBFU			Shore A57	
-	RBFS	Silicon Rubber (SI)	Light Gray	Shore A70	
-	RBFF			Shore A80	

Ⓜ Hanenaito® is a registered trademark of Naigai Rubber Industry Co., Ltd.

## L Selectable (Urethane)

Part Number Type	D	L Selection	(M) Applicable Screw	d1	d2	V	Unit Price							
							L10	L15	L20	L25	L30	L40	L50	
AYSK (x1.1) AYHK (x1.0) AYMK (x1.1) AYLK (x1.1) ( ) Material Multiplier	12	10	M3	11	6	3	-	-	-	-	-	-	-	-
	15	10 15 20	M4	14	8	4	-	-	-	-	-	-	-	-
	20	10 15 20 25	M5	19	9.5	5	-	-	-	-	-	-	-	-
	25	10 15 20 25 30	M6	24	11	6	-	-	-	-	-	-	-	-
	30	15 20 25 30 40	M8	29	14	8	-	-	-	-	-	-	-	-
40	25 30 40 50	M10	39	17	10	-	-	-	-	-	-	-	-	

## L Configurable (Urethane)

Part Number Type	D	1mm Increment	(M) Applicable Screw	d1	d2	V	Unit Price		
							L5-40	L41-60	L61-80
AYFS (x1.1) AYFH (x1.0) AYFM (x1.1) AYFL (x1.0) AYFY (x1.3) AYFHE (x1.2) AYFME (x1.2) AYFLE (x1.4) ( ) Material Multiplier	12	5-80	M3	11	6	3	-	-	-
	15		M4	14	8	4	-	-	-
	20		M5	19	9.5	5	-	-	-
	25		M6	24	11	6	-	-	-
	30		M8	29	14	8	-	-	-
40	M10	39	17	10	-	-	-		

The price of this product is the unit price shown in the table multiplied by material multiplier.

(Ex.) Part Number - L (Unit Price) x (Material Multiplier)  
AYFHE30 - 30 >>

## Characteristic Values of Antistatic Urethane

Specific Volume Resistivity	2.1x10 <sup>9</sup> Ω · cm
Surface Resistivity	4.0x10 <sup>9</sup> Ω

(Conditions: Temperature 30°C Humidity 60%)

All other properties are equal to those of urethane of the same hardness.

## L Configurable (Rubber)

Part Number Type	D	1mm Increment	(M) Applicable Screw	d1	d2	V	Unit Price			
							RBFN	RBFU	RBFS	RBFF
RBFN RBFU RBFS RBFF	15	5-30	M4	14	8	4	-	-	-	-
	20		M5	19	9.5	5	-	-	-	-
	25		M6	24	11	6	-	-	-	-
	30		M8	29	14	8	-	-	-	-

Ordering Example Part Number - L  
AYSK12 - 10  
AYFY25 - 52

# Urethane / Rubber Baked Bumpers

Collar Baked Type, Threaded Type

Collar Baked Type can be easily mounted as there is no backlash which often arises from tolerance between urethane and collar.

Threaded Bumpers contribute to reduced assembly time, improved tightening force, and save space by integrating conventional 3 parts (counterbored bumper, screw and collar) into a single part.

### Collar Baked Type

Type	Material		Hardness	Color
	Collar	Urethane		
AZKSS AZKHS AZKMS AZKLS	EN 1.4301 Equiv.	Ether Polyurethane Ester Polyurethane	Shore A95 Shore A90 Shore A70 Shore A50	Natural Color

## L Selectable

Part Number Type	D	L Selection	(M) (Coarse)	V	d	d2	T	H	Unit Price			
									AZKSS	AZKHS	AZKMS	AZKLS
Collar Baked Type	15	12 15 20	M3	7.5	3.5	5.5	2	5	-	-	-	-
AZKSS (Shore A95)	20	15 20 25	M4	8.5	4.5	6.5		7	-	-	-	-
AZKHS (Shore A90)	25	20 25	M5	10	5.5	8		8	-	-	-	-
AZKMS (Shore A70)			M6	12	6.6	9		8	-	-	-	-
AZKLS (Shore A50)			M8	14.5	9	11.5	8	-	-	-	-	

Ordering Example Part Number - L - M  
AZKSS15 - 15 - M3

### Product Features

- Eliminates backlash which arises from tolerance between urethane and collar.
- Reduced parts count leads to reduction in time and labor for press-fitting and management.

## Threaded Type

Type	Material		Hardness	Color
	L Selectable	L Configurable		
USBKS UHBKS UMBKS ULBKS	USBYS UHBYS UMBYS ULBYS	Ether Polyurethane	Shore A95 Shore A90 Shore A70 Shore A50	Natural Color
UEHBKS UEMBKS NBBKS NSBKS	UEHBYS UEMBYS NBBYS UNBYS	Ester Polyurethane Abrasion Resistant Urethane Nitrile Rubber (NBR) Low Elasticity Rubber (Hanenaito®)	Shore A90 Shore A70 Shore A70 Shore A32	Dark Brown Black

Material of Screw Part: EN 1.4301 Equiv. Surface Treatment: None

## L Selectable

Part Number Type	D	L Selection	(M) (Coarse)	B	A	V	E	m	Unit Price			
									U_BKS	UE_BKS	NBBKS	NSBKS
USBKS (Ether Polyurethane Shore A95)	12	10 15	M4 x0.7	3	7	5	4	6	-	-	-	-
			M6 x1.0	5	10	8	6	10	-	-	-	
	15	10 15 20	M5 x0.8	4	9	7	5	8	-	-	-	
			M8 x1.25	6	13	9	8	12	-	-	-	
UHBKS (Ether Polyurethane Shore A90)	20	20 25 30	M6 x1.0	5	10	8	6	10	-	-	-	
			M10 x1.5	8	16	11	10	15	-	-	-	
	25	20 25 30	M6 x1.0	5	10	8	6	10	-	-	-	
			M8 x1.25	6	13	9	8	12	-	-	-	
UMBKS (Ester Polyurethane Shore A70)	30	20 25 30	M6 x1.0	5	10	8	6	10	-	-	-	
			M8 x1.25	6	13	9	8	12	-	-	-	
	12	5-50	M4 x0.7	3	7	5	4	6	-	-	-	
			M6 x1.0	5	10	8	6	10	-	-	-	
15	7-50	M8 x1.25	6	13	9	8	12	-	-	-		
		M10 x1.5	8	16	11	10	15	-	-	-		
20	9-50	M10 x1.5	8	16	11	10	15	-	-	-		
		M10 x1.5	8	16	11	10	15	-	-	-		

## L Configurable

Part Number Type	D	1mm Increment	(Coarse) M	B	A	V	E	m	Unit Price			
									U_BYS	UE_BYS	NBBYS	UNBYS
USBYS (Ether Polyurethane Shore A95)	12	5-50	M4 x0.7	3	7	5	4	6	-	-	-	-
			M6 x1.0	5	10	8	6	10	-	-	-	
	15	7-50	M8 x1.25	6	13	9	8	12	-	-	-	
			M10 x1.5	8	16	11	10	15	-	-	-	
20	9-50	M10 x1.5	8	16	11	10	15	-	-	-		
		M10 x1.5	8	16	11	10	15	-	-	-		

L dimensions of Nitrile Rubber (NBBYS) and Low Elasticity Rubber (UNBYS) are up to 30.

Ordering Example Part Number - L - M  
USBYS12 - 10 - M4

## Product Features

Before: Bumper, Screw, Collar (3 parts) With M8 Screw Space for 25mm O.D. is required.

Threaded Urethane Bumper 1 pc.

- Reduced Parts Count → Reduced Assembly Time
- Increased Tightening Force
- Space Saving

Installable in a Space for a Bumper with 20mm O.D.

Space Saving Approx. 20%

Threaded Urethane Bumper

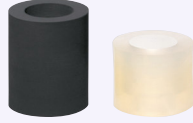


# Counterbored Rubber Bumpers

L Selectable

Black Oxide, Electroless Nickel Plating and EN 1.4301 Equiv. Collars are also available.

## L Selectable

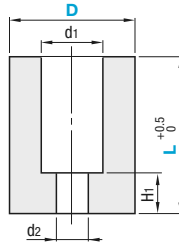


RoHS

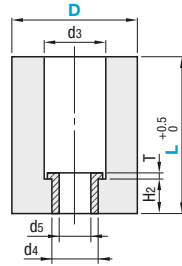
Rubber Only	With Collar			Material	Hardness	Color
	Black Oxide	Electroless Nickel Plating	EN 1.4301 Equiv.			
RBZNK	RBZNK-C	RBZNK-M	RBZNK-S	Nitrile Rubber (NBR)	Shore A70	Black
RBZCK	RBZCK-C	RBZCK-M	RBZCK-S	Chloroprene Rubber (CR)	Shore A65	Black
RBZUK	RBZUK-C	RBZUK-M	RBZUK-S	Low Elasticity Rubber	Shore A32	Black
RBZSK	RBZSK-C	RBZSK-M	RBZSK-S	Silicon Rubber (SI)	Shore A70	Light Gray
RBZAK	RBZAK-C	RBZAK-M	RBZAK-S	Silicon Rubber (SI)	Shore A50	Milky White
RBZFK	RBZFK-C	RBZFK-M	RBZFK-S	Fluororubber (FPM)	Shore A80	Black

The milky white color of silicone rubber shore A 50 is translucent.

Rubber Only



With Collar



Hole Diameter of Applicable Screw

Screw Size	Rubber Only		With Collar		T
	d1	d2	d3	d4	
M3	6	4	8	5.5	3.5
M4	8	5	9.5	6.5	4.5
M5	9.5	6	11	8	5.5
M6	11	7	13	9	6.6
M8	14	9	15.5	11.5	9
M10	18	11	19	14	11
M12	20	14	22	17	14

**D Tolerance**

D	Tolerance
40 or Less	±0.5
50, 60	±0.7

**d2, d4, H1, d1 and d3 Tolerance**

Dimension	Tolerance
30 or Less	±0.5
	±0.5
	±0.5

# Counterbored Rubber Bumpers, Collars for Counterbored Bumpers

Configurable Type

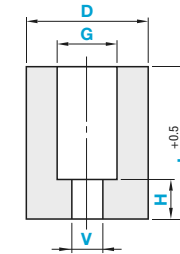
## Configurable Type



RoHS

Type	Material	Hardness	Color
RBZN	Nitrile Rubber (NBR)	Shore A70	Black
RBZC	Chloroprene Rubber (CR)	Shore A65	Black
RBZU	Low Elasticity Rubber (Harenait® GP-35L)	Shore A32	Black
RBZS	Silicon Rubber (SI)	Shore A70	Light Gray
RBZA	Silicon Rubber (SI)	Shore A50	Milky White
RBZF	Fluororubber (FPM)	Shore A80	Black
RBZAM	Amber Color Rubber	Shore A45	Amber Color

The milky white color of silicone rubber shore A 50 is translucent.



D Tolerance

D	Tolerance
40 or Less	±0.5
41~60	±0.7

V, H, G Tolerances

Dimension	Tolerance		
	V	H	G
30 or Less	±0.5	±0.5	±0.5
31~	-	±0.7	±0.6

When L≤30, V≤G-4.  
When L>30, V≤G-6.

Part Number	Type	D	L Selection	(M) Applicable Screw	Rubber Only H1	With Collar		Rubber Only				Collar Type			Unit Price
						H2	Applicable Collar No.	RBZNK	RBZCK	RBZUK	RBZSK	RBZAK	RBZFK	Black Oxide RBZ_K-C	
12	12	12		M3	5	3									
15	12 15	15		M4	5	4									
20	20 25	20		M5	7	5									
25	20 25	25		M6	8	6									
30	20 25 30	30		M8	8	8									
40	30 40	40		M10	12	10									
50	30 40 50	50		M12	15	12									
60	40 50	60		M12	15	12									

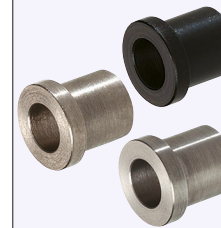
D12 is not available for Collar Type. L≤30 for Low Elasticity Rubber (RBZUK) and Fluororubber (RBZFK).

For applicable collar dimensions, see Collars for Counterbored Urethane and Rubber Bumpers.

Ordering Example: Part Number - L - M  
RBZCK25 - 20 - M6

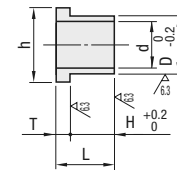
Ordering Example: Part Number - D - V - H - G - L  
RBZAM - D22 - V5 - H10 - G12 - L38

## Collars for Counterbored Bumpers



RoHS

Type	Material	Surface Treatment
AZC	EN 1.1191 Equiv.	Black Oxide
AZM	EN 1.4301 Equiv.	Electroless Nickel Plating
AZS	EN 1.4301 Equiv.	-



Part Number	Type	No.	d	D	H	T	L	h	Unit Price		
									AZC	AZM	AZS
3		3	3.5	5.5	5	7	7.5				
4		4	4.5	6.5	7	9	8.5				
4A		4A	4.5	6.5	7	9	10				
5		5	5.5	8	8	10	12				
6		6	6.6	9	8	10	14.5				
8		8	9	11.5	6	8	17				
8A		8A	9	11.5	6	8	17				
10		10	11	14	10	3	13	17			

No.10 is for AZC only.

Ordering Example: Part Number  
AZC4A

# Urethane / Rubbers

## Spherical Tip, Tapered Tip

Bumpers with spherical and tapered tips are available in a short delivery time. Hole length is configurable for Through Hole Type.

**Spherical Tip**

Through Hole Type	No Hole Type	Material	Hardness	Color
UTRS	CXTRS	Ether Polyurethane	Shore A95	Natural Color
UTRH	CXTRH		Shore A90	
UTRM	CXTRM		Shore A70	
UTRL	CXTRL	Ester Polyurethane	Shore A50	Natural Color
UBFN	CXBFN		Nitrile Rubber (NBR)	
UBFS	CXBFS	Silicon Rubber	Shore A70	Light Gray
UBFU	CXBFU	Low Elasticity Rubber (Hanenaito® GP-35L)	Shore A32	Black
UBFF	CXBFF	Fluororubber	Shore A80	Black

ⓂHanenaito® is a registered trademark of Naigai Rubber Industry Co., Ltd.

**V Tolerance**

V	Tolerance
30 or Less	±0.2
31~46	±0.5

**Thickness Condition**

L	V
L≤30	V≤D-4
L>30	V≤D-6

Conditions of L  
L≥D/2

ⓂFor Through Hole Type, through hole will be machined when VL dimension is not specified. ⓂSpecification of VL dimension is required. Through hole can be provided, but the bore cannot be stopped at SR.

### Urethane Configurable Type

Part Number (x Material Multiplier)	1mm Increment		Unit Price													
	D	L	Through Hole Type		Through Hole Type				No Hole Type							
			V	VL	L10~20	L21~30	L31~40	L41~50	L10~20	L21~30	L31~40	L41~50				
Through Hole Type No Hole Type	6~15	10~50 (L≥D/2)	2~11	5~50 (VL=L) or (VL≤L-D/2)												
(Shore A95) UTRS CXTRS (x1.4)	16~20		4~16													
(Shore A90) UTRH CXTRH (x1.0)	21~30		6~26													
(Shore A70) UTRM CXTRM (x1.2)	31~40		6~36													
(Shore A50) UTRL CXTRL (x1.4)	41~50		6~46													

ⓂThe thickness of Through Hole Type (D-V)/2 is restricted by L. Refer to the table (Thickness Condition) in the drawing.

### Rubber Configurable Type

Part Number	1mm Increment		Unit Price					
	D	L	Through Hole Type		Through Hole Type		No Hole Type	
			V	VL	L10~20	L21~30	L10~20	L21~30
Through Hole Type No Hole Type	6~15	10~30 (L≥D/2)	2~11	5~30 (VL=L) or (VL≤L-D/2)				
(Nitrile Rubber) UBFN CXBFN	16~25		7~21					
Through Hole Type No Hole Type	6~15		2~11					
(Silicon Rubber) UBFS CXBFS	16~25		7~21					
Through Hole Type No Hole Type	6~15		2~11					
(Low Elasticity Rubber) UBFU CXBFU	6~15		2~11					
Through Hole Type No Hole Type	6~15		2~11					
(Fluororubber) UBFF CXBFF	6~15		2~11					

Bumpers with tapered tips are available in a short delivery time. Hole length is configurable for Through Hole Type.

**Tapered Tip**

Through Hole Type	No Hole Type	Material	Hardness	Color
UTTS	CXTTS	Ether Polyurethane	Shore A95	Natural Color
UTTH	CXTTH		Shore A90	
UTTM	CXTTM		Shore A70	
UTTL	CXTTL	Ester Polyurethane	Shore A50	Natural Color
UTBFN	CXTBFN		Nitrile Rubber (NBR)	

**V Tolerance**

V	Tolerance
30 or Less	±0.2
31~52	±0.5

ⓂFor Through Hole Type, through hole will be machined when VL dimension is not specified.

Part Number (x Material Multiplier)	1mm Increment				Unit Price					
	D	A (A≤D-2)	L	C	Through Hole Type		Through Hole Type		No Hole Type	
					V	VL	L10~20	L21~30	L10~20	L21~30
Through Hole Type No Hole Type	6~15	2~13	10~30	1~29 (C<L)	2~11 (V≤A-2)	5~30 (VL≤L)				
(Shore A95) UTTS CXTTS (x1.4)	16~30	2~28			2~24 (V≤A-4)					
(Shore A90) UTTH CXTTH (x1.0)	31~45	2~43			2~37 (V≤A-6)					
(Shore A70) UTTM CXTTM (x1.2)	46~60	2~58			2~52 (V≤A-6)					
(Shore A50) UTTL CXTTL (x1.4)										
(Shore A70) UTBFN CXTBFN (x1.08)										

Prices and price multiplier have been revised according to the price list integration.

Ordering Example Part Number - D - L - V - VL  
UTRS - D20 - L40 - V10 - VL30  
CXBFF - D10 - L15

Ordering Example Part Number - D - A - L - C - V - VL  
UTTS - D15 - A13 - L15 - C10 - V5 - VL10  
CXTTH - D20 - A14 - L30 - C15

# Urethane, Rubbers

## Piloted Type

Bumpers with pilot tip ends are available in a short delivery time.

**Standard Type (No Hole Type)**

Standard	Configurable Type	Material	Hardness	Color
DXSK	DXFS	Ether Polyurethane	Shore A95	Natural Color
DXHK	DXFH		Shore A90	Natural Color
DXMK	DXFM	Ester Polyurethane	Shore A70	Natural Color
DXLK	DXFL		Shore A50	Natural Color
-	RBKN	Nitrile Rubber (NBR)	Shore A70	Black
-	RBKC	Chloroprene Rubber (CR)	Shore A65	Black
-	RBKU	Low Elasticity Rubber	Shore A32	Black
-	RBKS	Silicon Rubber (SI)	Shore A70	Light Gray
-	RBKA	Silicon Rubber (SI)	Shore A50	Milky White
-	RBKF	Fluororubber (FPM)	Shore A80	Black

ⓂThe milky white color of silicone rubber shore A 50 is translucent.

**T Tolerance**

T	Urethane	Rubber
30 or Less	±0.2	±0.3
31 ~ 50	±0.3	-

**D Tolerance**

D	Urethane	Rubber
40 or Less	±0.2	±0.5
41~60	±0.3	±0.7
61~100	±0.4	-

**C Tolerance**

C	Urethane	Rubber
40 or Less	+0.2 0	+1.0 0
41 or More	+0.3 0	+1.4 0

ⓂStandard Type has no hole.

### Standard Type (No Hole Type)

Part Number	Type	D	V Selection	T Selection	L Selection	Unit Price			
						DXSK	DXHK	DXMK	DXLK
DXSK (Shore A95)	8	5	3 5	8 10	8 10				
						8 10	13 15		
	10	5 8	3 5	8 10 15	14 16 18 21 23				
						8 10 15	16 18 21 23 25		
	15	8 10	3 5	8 10 15	16 18 20 23 25				
						8 10 15	18 20 23 25		
	20	10 15	5 8	5 8 10 15	18 20 23 25				
						5 10	15 20 25		
	25	15 20	5 8	15 20 25	25 30 35 40				
						5 10	15 20 25		
	30	20 30	5 8	15 20 25	25 30 35 40				
						5 10	15 20 25		
40	30 40	5 8	15 20 25	25 30 35 40					
					5 10	15 20 25			
50	30 40	5 8	15 20 25	25 30 35 40					
					5 10	15 20 25			
60	30 40	5 8	15 20 25	25 30 35 40					
					5 10	15 20 25			

### Urethane Configurable (Hole Configurable Type)

Part Number	1mm Increment					Unit Price			
	D	V (V<D)	T	L	C	DXFS	DXFH	DXFM	DXFL
DXFS (Shore A95)	6~15	3~14	2~30	4~10	0 (No Hole)				
				11~25					
				26~40					
				41~50					
DXFH (Shore A90)	16~30	6~29	5~40	7~10	2~40				
				11~25					
				26~40					
				41~50					
DXFM (Shore A70)	31~45	10~44	5~40	7~10	10~55				
				11~25					
				26~40					
				41~50					
DXFL (Shore A50)	46~60	15~59	5~45	7~10	10~55				
				11~25					
				26~40					
				41~50					

ⓂC≤V-4 ⓂL-T≤Vx3

ⓂFor Urethane Configurable Type, configurable dimension range has been shortened.

Ordering Example Part Number - D - V - T - L - C  
DXFL - D49 - V30 - T6 - L42 - C0

### Rubber Configurable (Hole Configurable Type)

Part Number	1mm Increment					Unit Price				
	D	V (V<D)	T	L	C	RBKN	RBKC	RBKU	RBKA	RBKF
RBKN (Nitrile Rubber (NBR))	6~15	3~14	2~30	4~10	0 (No Hole)					
				11~20						
				21~30						
				31~50						
RBKC (Chloroprene Rubber (CR))	16~30	6~29	5~40	7~10	2~40					
				11~20						
				21~30						
				31~50						
RBKU (Low Elasticity Rubber)	31~45	10~44	5~40	7~10	10~50					
				11~20						
				21~30						
				31~50						
RBKA (Silicon Rubber (SI))	46~60	15~59	5~45	7~10	10~50					
				11~20						
				21~30						
				31~50						
RBKF (Fluororubber (FPM))	6~15	3~14	2~30	4~10	10~50					
				11~20						
				21~30						
				31~50						

ⓂC≤V-4 ⓂL-T≤Vx3

ⓂL≤30 for RBKU, RBKS and RBKF.



# Urethane, Rubbers

## Cap Type

■ Caps useable for protection of various tips.

Standard	Configurable Type	Material	Hardness	Color
UTCS	UTNS	Ether Polyurethane	Shore A95	Natural Color
UTCH	UTNH		Shore A90	Natural Color
UTCM	UTNM		Shore A70	Natural Color
UTCL	UTNL	Ester Polyurethane	Shore A50	Natural Color
RBCN	RBNN		Nitrile Rubber (NBR)	Shore A70
RBCC	RBNC	Chloroprene Rubber (CR)	Shore A65	Black
RBCU	RBNU	Low Elasticity Rubber	Shore A32	Black
RBCS	RBNS	Silicon Rubber (SI)	Shore A70	Light Gray
RBCA	RBNA		Shore A50	Milky White
RBCF	RBNF	Fluororubber (FPM)	Shore A80	Black

Ⓜ The milky white color of silicone rubber shore A 50 is translucent.  
Ⓜ For Urethane Type, I.D. tolerance has been changed.

Tolerance	Urethane	Rubber
30 or Less	±0.2	±0.3
31 ~ 50	±0.3	-

D Tolerance	Urethane	Rubber
40 or Less	±0.2	±0.5
41~60	±0.3	±0.6
61~100	±0.4	-

V Tolerance	Urethane	Rubber
2~50	-0.2 -0.4	0 -1.0
51~	-0.2 -0.5	0 -1.2

RoHS

Part Number		Unit Price	
Type	D	V Selection	T Selection
UTCS (Shore A95)	6	2	2 3 4 5
UTCH (Shore A90)	8	3 4	4 5 6 8
UTCM (Shore A70)	9	3 5	5 6 7 10
UTCL (Shore A50)	10	4 6	6 8 10 12
RBCN (Nitrile Rubber (NBR))	12	6 8	8 9 10
RBCC (Chloroprene Rubber (CR))	15	8 10	10 15 20 30
RBCU (Low Elasticity Rubber)	20	12 16	15 20 25 30
RBCS (Shore A70)	25	15 20	20 25 30
RBCA (Shore A50)	30	20 25	25 30
RBCF (Fluororubber (FPM))			

Ordering Example: Part Number - V - T - L  
UTCH8 - 3 - 2 - 4

Part Number		Unit Price	
Type	D	V	T
UTNS (Shore A95)	6-15	2-11	2-30
UTNH (Shore A90)	16-30	12-26	2-30
UTNM (Shore A70)	31-45	27-41	5-40
UTNL (Shore A50)	46-60	42-56	5-50

Part Number		Unit Price	
Type	D	V	T
RBNN (Nitrile Rubber (NBR))	6-15	2-11	2-10
RBNC (Chloroprene Rubber (CR))	16-30	12-26	2-10
RBNU (Low Elasticity Rubber)	31-45	27-41	5-15
RBNS (Shore A70)	46-60	42-56	5-15
RBNA (Silicon Rubber (SI))			
RBNF (Fluororubber (FPM))			

Ⓜ (Y)=T+L Ⓜ V≤D-4  
Ⓜ For Urethane Configurable Type, configurable dimension range has been shortened.

Ⓜ (Y)=T+L Ⓜ V≤D-4 Ⓜ (Y)≤50  
Ⓜ (Y)≤30 for RBNU, RBNS and RBNF.

Ordering Example: Part Number - D - V - T - L  
RBNN - D60 - V50 - T5 - L20

# Shock Absorbing Bumpers

## Tapped, Threaded

■ New bumpers provided with shock and sound absorbing effect, made of soft shock-absorbing gel. For material properties, see P.389

RoHS

Material: Viscoelastic Elastomer (Gray)  
Hardness: Asher F75 (Two-layered; F98 for Outer Layer)  
Core Rod Material: EN 1.4301 Equiv.

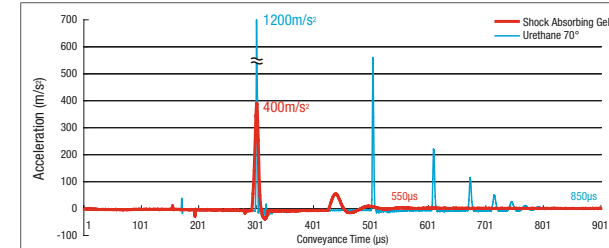
Part Number	D	H	L	L1	L2	L3	L4	M	W	Unit Price
12	8	22	11	4	3	7	M5x0.8	10		
16	10	28	14	5	4	11	M6x1.0	14		
16A	10	31	17	5	4	14	M8x1.25	14		
20	13	35	17	6	5	14	M8x1.25	17		
20A	13	39	21	6	5	16	M10x1.25 (Fine)	17		
30	15	44	24	8	5	20	M12x1.75	27		
30A	15	46	26	8	5	22	M14x1.5 (Fine)	27		

Part Number	D	H	L	L1	L2	L3	M	W	m	f	Unit Price
12	8	16	5	4	3	M5x0.8	10	8	1.5		
16	10	20	6	5	4	M6x1.0	14	10	2		
20	13	26	8	6	5	M8x1.25	17	12	2		
30	15	30	10	8	5	M10x1.5	27	14	2.5		

Ordering Example: Part Number GELMR16A

- Precaution for Use
- Do not stick or cut with sharpened objects.
  - Do not tear or twist.
  - Insert it only from the vertical direction.
  - Keep away from fire.
  - Do not use detergents for cleaning.
  - Replace it when broken.

### Variation of Impact Acceleration Comparison Test



	Max. Impact Acceleration (m/s²)	Conveyance Time (µs)
Shock Absorbing Gel	400	550
Urethane 70 deg.	1200	850
Urethane 50 deg.	836	1273
Extra Low Hardness Urethane 15 deg.	450	1660
Low Rebound Urethane	1750	450
Nitrile Rubber	1050	670
Low Rebound Rubber	1580	400

\* Conveyance time is defined as the time until acceleration falls below 10m/s².

■ From Test Results  
Peak acceleration of the shock absorbing gel is lower at around 30% of other materials and deceleration damping is higher.  
(Extra low hardness urethane has a low peak value as well, but takes three times longer to converge.)  
This is because the material transmits energy dispersing in multiple directions, while absorbing impact force. From these characteristics, effects such as impact absorption and noise reduction can be expected. (Effects vary depending on operation environment.)

■ Test Conditions  
Measuring Method: Measured with accelerometer secured on the hammer dropped on the test materials.  
Size of Test Material: ø30, Height 20mm  
Measuring Instruments:  
Hammer: Weight 958g, Drop Height 255mm  
Length from Fulcrum to Barycenter: 255mm

Equipments:  
Acceleration Pickup (Briel & Kjaer Type 4507B001)  
Data Logger (Keyence NR-500, NR-HA08)  
PC, Sensor Amplifier (Ono Sokki SR-2200)  
Measurement Condition: Temperature 18°C, Humidity 40%

### Elasticity of Shock Absorbing Gel

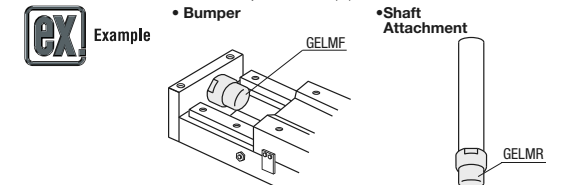
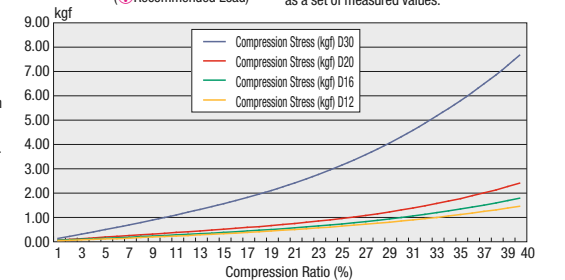


A major characteristic is the three-dimensional slow recovery, the function to recover after compression slowly and in multiple directions. Pressed as thin as shown in the photo and recovers to the original shape gradually after being released from pressure. \* The double-layer structure of the gel part reduces stickiness.

### (40%) Compressive Load Test Results

D	12	16	20	30
40% Compression Load Average (kgf)	1.4	1.8	2.4	7.7

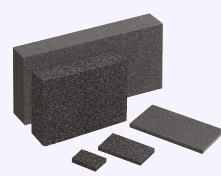
Ⓜ (Recommended Load) Ⓜ These are not guaranteed values but an example as a set of measured values.



# EPT Sealer<sup>®</sup> Sponge, Opsealer<sup>®</sup> Sponge

# Special Foam Polyurethane SOFRAS<sup>®</sup> Sheet Type, Rolled Type

■ Semi-closed cell foam can be compressed at small rebound stress, and changes its structure to closed cell after the compression. Therefore, water cannot pass through the material.



**EPA** (Adhesive)  
**EPAOP** (Adhesive)  
**EPAN** (No Adhesive)

Ⓜ A≥B

Type	① Material	②
EPA	EPDM Foam (EPT Sealer <sup>®</sup> )	Adhesive with Unwoven Cloth Base Material
EPAOP	EPDM Foam (Opsealer <sup>®</sup> )	Adhesive with Net Base Material

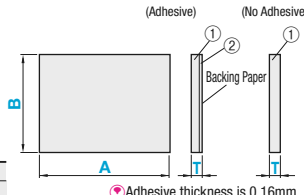
Ⓜ Material

Ⓜ Adhesive thickness is 0.16mm.

Ⓜ Adhesive thickness is 0.06 ~ 0.10mm.

**Accuracy Standards**

T Dimension Tolerance		A, B Dimension Tolerance	
T	Tolerance	A, B	Tolerance
3~10	±1.0	20	±2.0
15~25	±2.0	30~50	±2.5
30	±2.5	60~140	±3.5
		150~290	±6.5
		300~500	±9.0




Ⓜ Adhesive thickness is 0.16mm.

Ⓜ Adhesive thickness is 0.06 ~ 0.10mm.

Ⓜ EPT Sealer<sup>®</sup> is a registered trademark of Nitto Denko Corporation.  
Ⓜ Opsealer<sup>®</sup> is a registered trademark of Sanwa Kako Co., Ltd.

■ This special urethane foam has good water retention and wear resistance allowing it to be used in industrial purposes such as application and moisture absorption.

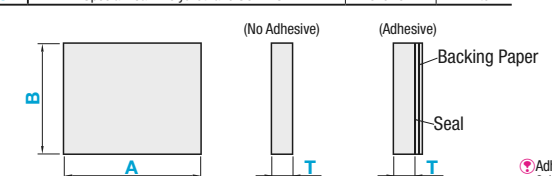
**Sheet Type**



RoHS

Type	Material	Hardness	Color
No Adhesive SOFRAS	Special Foam Polyurethane SOFRAS <sup>®</sup>	Asker C11	White
Adhesive SOFRASA			

Ⓜ SOFRAS<sup>®</sup> is a registered trademark of AION Co., Ltd.



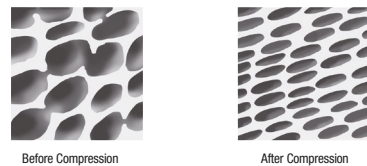
Ⓜ Adhesive thickness is 0.06 ~ 0.10mm.

Part Number	10mm Increment		Selection T
	A	B	
EPA	20~500	20~400	3
EPAOP			5
EPAN			8
			10
			15
	20		
	25		
	30		

Ordering Example

Part Number	A	B	T
EPA	100	80	8
EPAOP	200	100	30
EPAN	150	100	10

• Semi-closed Cell Structure



■ Characteristic Values (The values are not guaranteed but measured ones.)

Measurement Item	EPA	EPAOP
Color	Black	Black
Specific Gravity	0.11	0.08
Tensile Strength (Mpa)	0.08	0.1
Elongation (%)	450	205
Compression Hardness (25%) (kg/cm <sup>2</sup> )	0.02	0.04
Compression Hardness (50%) (kg/cm <sup>2</sup> )	0.05	0.05
Compression Rate (%)	50	△
	60	△
	70	○
	80	○

○ : No leakage of water after 30mins.  
△ : Leakage of water is seen within 30mins.  
× : Leakage of water is seen within 10mins.

Ⓜ The price of this product is the unit price shown in the table multiplied by material multiplier.  
(Ex) Part Number - A - B - T >> (Price in the Table) x (Material Multiplier) = Standard Type Unit  
EPAN -150 - 100 - 10

Part Number	T	A	Unit Price			
			B	20-100	110-200	210-300
EPA (x1.0)	3	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	5	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	8	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
10	20-100	-	-	-	-	
	110-200	-	-	-	-	
	210-300	-	-	-	-	
	310-400	-	-	-	-	
	410-500	-	-	-	-	

Part Number	T	A	Unit Price			
			B	20-100	110-200	210-300
EPA (x1.0)	15	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	20	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	25	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
30	20-100	-	-	-	-	
	110-200	-	-	-	-	
	210-300	-	-	-	-	
	310-400	-	-	-	-	
	410-500	-	-	-	-	

Part Number	T	A	Unit Price			
			B	20-100	110-200	210-300
EPAOP (x0.9)	3	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	5	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	8	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
10	20-100	-	-	-	-	
	110-200	-	-	-	-	
	210-300	-	-	-	-	
	310-400	-	-	-	-	
	410-500	-	-	-	-	

Part Number	T	A	Unit Price			
			B	20-100	110-200	210-300
EPAOP (x0.9)	15	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	20	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
	25	20-100	-	-	-	-
		110-200	-	-	-	-
		210-300	-	-	-	-
		310-400	-	-	-	-
		410-500	-	-	-	-
30	20-100	-	-	-	-	
	110-200	-	-	-	-	
	210-300	-	-	-	-	
	310-400	-	-	-	-	
	410-500	-	-	-	-	

Part Number	5mm Increment	Selection	
Type	A	B	T
No Adhesive SOFRAS	10-480	10-270	5
Adhesive SOFRASA	20-480	20-270	10
			15
			20

Ordering Example

Part Number - A - B - T  
SOFRAS - 300 - 200 - 10

■ Adhesive Charge

A	B	
	10-100	105-200
10-100	-	-
105-200	-	-
205-300	-	-
305-400	-	-
405-480	-	-

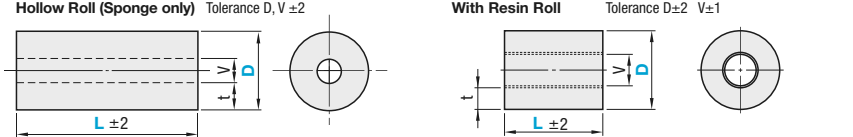
Type	T	A	Unit Price		
			B	10-100	105-200
No Adhesive SOFRAS	5	10-100	-	-	-
		105-200	-	-	-
		205-300	-	-	-
		305-400	-	-	-
		405-480	-	-	-
Adhesive SOFRASA	10	10-100	-	-	-
		105-200	-	-	-
		205-300	-	-	-
		305-400	-	-	-
		405-480	-	-	-

Type	T	A	Unit Price		
			B	20-100	105-200
No Adhesive SOFRAS	15	20-100	-	-	-
		105-200	-	-	-
		205-300	-	-	-
		305-400	-	-	-
		405-480	-	-	-
Adhesive SOFRASA	20	20-100	-	-	-
		105-200	-	-	-
		205-300	-	-	-
		305-400	-	-	-
		405-480	-	-	-

■ Rolled Type

Type	Type		Material	Hardness	Color
	Hollow Roll (Sponge only)	With Resin Roll			
	SOFRAS	SOFRASRP	Sponge: Special Foam Polyurethane SOFRAS <sup>®</sup> Resin Roll: Polypropylene (PP)	Asker C7	White

Hollow Roll (Sponge only) Tolerance D, V ±2      With Resin Roll Tolerance D±2 V±1



Type	Part Number	Selection	5mm Increment	V	t
Hollow Roll (Sponge only)	SOFRAS	40	30-600	22	9
With Resin Roll	SOFRASRP	40	30-600	16	9

Type	Part Number	D	Unit Price					
			L (5mm Increment)	30-100	101-200	201-300	301-400	401-500
Hollow Roll (Sponge only)	SOFRAS	40						
With Resin Roll	SOFRASRP	40						

■ Enlarged Photo

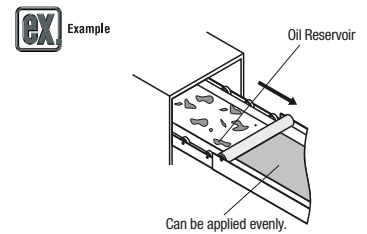


■ Enlarged Photo of Grease-impregnated Special Urethane



■ Material Properties

Air Bubble	Continuous Cell		Lamination	Semi-closed Cell	Independent Cell
Material	SOFRAS <sup>®</sup>	Urethane Foam	Felt	EPT Sealer <sup>®</sup>	CR, EPDM, NBR, Silicon, Fluorine
Page	P446	P441	P447	P445	P441
Application Example	Application and Moisture Absorption			Dust-proof and Protection	
Apparent Density g/cm <sup>3</sup>	0.2	0.02	0.2	-	0.1~0.3
Tensile Strength kPa	1000	76	-	-	-
Water Retention Rate %	400	-	80	-	-
Heat Resistant °C	130	70	120	-	130~200
Water Retention	○	○	○	△	×
Abrasion Resistance	○	×	×	×	○
Water Resistance	○	△	○	×	○
Chemical Resistance	○	×	△	×	×



# Felt Sheets

A wide variety of felt materials (w/ or w/o adhesive backings) is available in 10mm increment. Most suitable for cushion, liquid application and grinding media.

**Felt Sheets**

RoHS

No Adhesive	Adhesive	Material	Density (g/cm <sup>3</sup> )	Color	Allowable Temperature
FELP	FELPA	Polyester Felt	0.2 (0.18 for 5.5mm)	White	0 ~ 120°C
FELPET	FELPETA	Polyester Felt (with Binder)	0.32	Gray	0 ~ 80°C
FELH	FELHA	Polyamide Felt	0.2 (0.27 for 1mm)	White	-50 ~ 250°C
FELWL	FELWLA	Sheep Wool Felt (Rayon, PET blended)	0.25	Ivory	-10 ~ 60°C
FELW	FELWA	Sheep Wool Felt	0.6		

Adhesive thickness is 0.06 ~ 0.10mm.

Dimensional Tolerances of A and B

20-200	210-400	410-1000
±2	±4	±6

Part Number	T Selection	10mm Increment	
		A	B
FELP FELPA	1 3 5.5	20-1000	20-950
FELPET FELPETA	5		
FELH FELHA	1 4 6	20-500	20-500
FELWL FELWLA	2 5 10		
FELW FELWA			

Ordering Example

Part Number - A - B

FELP3 - 500 - 350

Part Number	Type	T	A (10mm Increment)	Unit Price				
				B (10mm Increment)				
No Adhesive FELP Adhesive FELPA (x1.3) (Material Multiplier)	1		20-200					
			210-400					
			410-600					
			610-800					
			810-1000					
			810-1000					
	3		20-200					
			210-400					
			410-600					
			610-800					
			810-1000					
			810-1000					

The price of this product is the unit price shown in the table multiplied by material multiplier.

Part Number - A - B >> (Unit Price) x (Material Multiplier) = Standard Type Unit Price

FELPA3 - 600 - 600 >>

Part Number	Type	T	A (10mm Increment)	Unit Price				
				B (10mm Increment)				
No Adhesive FELPET Adhesive FELPETA (x1.2)	5		20-100					
			110-200					
			210-300					
			310-400					
			410-500					
			410-500					
	1		20-100					
			110-200					
			210-300					
			310-400					
			410-500					
			410-500					

Part Number	Type	T	A (10mm Increment)	Unit Price				
				B (10mm Increment)				
No Adhesive FELWL Adhesive FELWLA (x1.1) (Material Multiplier)	2		20-100					
			110-200					
			210-300					
			310-400					
			410-500					
			410-500					
	5		20-100					
			110-200					
			210-300					
			310-400					
			410-500					
			410-500					

# Felt Bumpers

## Washers, Bumpers

Felt material typically used for oil applicators and air-tight gaskets are offered as bumpers and washers.

**Felt Bumpers**

RoHS

Type	No Adhesive	Adhesive	Material	Density (g/cm <sup>3</sup> )	Color	Allowable Temperature
Washer	WFEP	WFEPA	Polyester Felt	0.2	White	0 ~ 120°C
	WFEH	WFEHA	Polyamide Felt			-50 ~ 250°C
Bumper	BFEL	BFELA	Polyester Felt	Refer to the following		-10 ~ 60°C

Allowable temperature for adhesive is 0 ~ 80°C.

L	Density (g/cm <sup>3</sup> )
10	0.12
20	0.08
30	0.07

### Washer Type

Part Number	Type	D	V Selection				T Selection	Unit Price				
			WFEH	WFEPA	WFEH	WFEHA						
No Adhesive WFEP WFEH		8	0	3		3 (WFEP WFEPA)						
		10	0	4								
		12	0	4	6							
Adhesive WFEPA WFEHA (x1.1)		15	0	4	6	8	4 (WFEH WFEHA)					
		20	0	6	8	10		12				
		25	0	6	8	10		12	16	20		
		30	0	6	8	10		12	16	20		
		30	0	6	8	10		12	16	20		

( ) Material Multiplier

\* T dimension for Polyester Felt is 3mm, for Polyamide Felt is 4mm.

### Bumper Type (L dimensions indicate the length of felt base materials. The values are for reference only.)

Part Number	Type	D	L Selection	V	Unit Price		
					L10	L20	L30
No Adhesive BFEL Adhesive BFELA (x1.1) ( ) Material Multiplier		20	10 20 30	0			
				10			
				0			
				10			

\* This product, especially L dimension 20 and 30, may be deformed during delivery.

Ordering Example

Part Number - V - T

WFEP10 - 4 - 3

Part Number - L - V

BFEL20 - 10 - 10

### Features of Materials

Material	Details of Material	Application Example
Polyester Felt (Sheet)	Felt made of 100% polyester Soft with Density of 0.18 ~ 0.2. General-purpose Product.	Applicable to general purpose use as oil / water absorption, cushioning materials, etc.
Polyester Felt (with Binder)	PET : PET Binder (Bonding Material) =9:1 Fibers bonded together by the binder provides high morphological stability.	Protection material and bumper for portions exposed to high impact.
Polyamide Felt	Felt made of 100% polyamide Excellent heat/flame resistances. UL Std. Test V-0 Equiv.	Heat Resistant / Flame Retardant Bumpers
Sheep Wool Felt (Rayon, PET)	Felt made of 60 % sheep wool and 40% PET. JIS-R25W2 Standard Product. Excellent in oil/water retention ability.	Cushion Material, Liquid Application (Oiling), Spacer
Sheep Wool Felt	Felt made of 100% sheep wool Gives less damage to mating materials.	For Buffing
Polyester Felt (Bumper Type)	Density may vary depending on L dimensions.	Oil Application to Workpieces

\*The application examples above are references not guaranteed.

### Characteristics of Felt

- Excellent in weather resistance. (Affected by alkaline solution.)
- Excellent in oil absorbability. It has the property of soaking up oil by capillary action.
- Excellent in oil absorbability. It can absorb up to approx. 80% of its total volume.
- Has good polishing characteristics. Provides high polishing characteristics as it precipitates foreign materials within its tissue.