Washers / Collars / Shims

Washers, Collars Shims






Product Name	Metal Washers Washers (Bulk Packages)	Metal Washer - Standard Grade, T Dimention Selectable / Configurable	T Dimension Selectable / Configurable	Precision Grade, T Dimension Selectable/Configurable Standard / Precision Grade, Dimension Configurable
Page	112	113	114	115







Standard / Precision Grade I.D. / O.D. Tolerance Selectable / Dimension Configurable	Hardened Type, Standard Grade / Precision Grade, T Dimension Selectable	Hardened Type, Standard Grade / Precision Grade, Dimension Configurable	Standard Grade / High Precision Grade, Inner and Outer Dia. Tolerance Selectable / Dimension Configurable	Metal Washer - Flanged
117	119	120	121	122



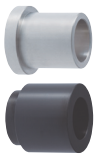




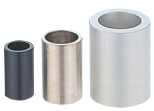
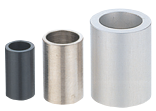
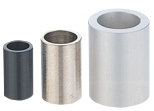
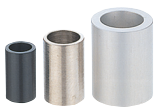
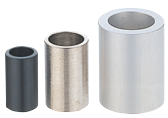

Counterbored	Tapped	Countersunk	With Screw Holes	Shape Selectable	Slotted Hole Washers
123	125	126	126	127	127



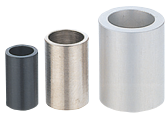
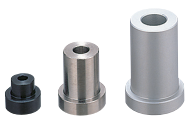




Thin-Walled Metal Collars	Hollow Collars	Spacers	Simultaneous Grinding Spacers	Stepped Spacers
128	128	128	129	130

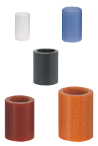
Metal Collar - Standard Grade, L Dimension Selectable	Standard Grade / Precision Grade, L Dimension Configurable	Standard / Precision Grade, Dimension Configurable	Standard / Precision Grade I.D. / O.D. Tolerance Selectable / Dimension Configurable	Hardened Type, Standard Grade / Precision Grade, L Dimension Configurable
131	132	133	135	137




Hardened Type, Standard Grade / Precision Grade, Dimension Configurable	Metal Washers - Flanged, Standard/Precision Grade	Resin Washer - Standard, Dimension Configurable	Extra Thin Resin Washers - Abrasion Resistance	Extra Thin Resin Washers
138	139	143	145	145








Resin Washers - Flanged Solid / Flanged	Resin Collar - Standard	Resin Collar - Flanged	Resin Collar - Counterbored	Resin Collar - Tapped
146	147	149	151	151



Resin Collar - With Guide
152



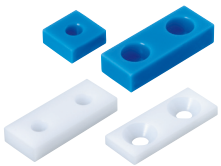
Ceramic Washers / Sheets / Collars
153



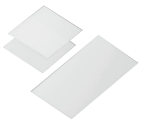
Thermal Insulation Washers / Collars
154



Washers/Collars - Fluororesin / Epoxy Glass / PEEK
155



Square Resin Washers
156



Sheet
156



Shim Rings Package
157



Shim Rings
158



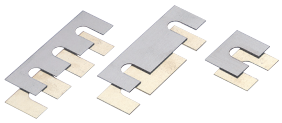
Precision Grade Shim Rings
159



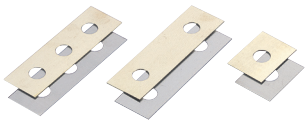
Wave Washers
159



Split Type
160



Square Shims - Slotted Hole
161



Round Hole
161



Square Shims - For Motor Base / For Pillow Block
163



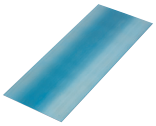
Square Shims Package
164



Square Shim - Adjustment
164



Shim Plates - Standard / Configurable
165



Shim Plates (SK Hardened Steel)
166



Shim Tape
166



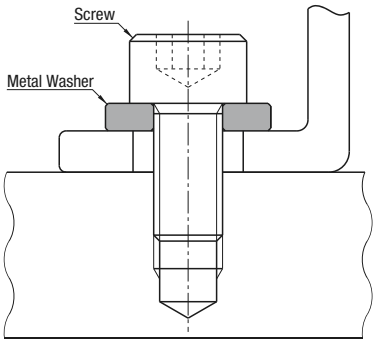
Shim Tape Boxes
166

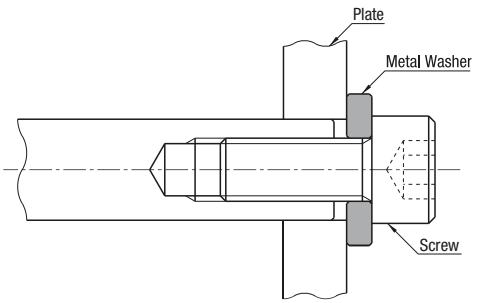
App. Example - Metal Washers / Collars

Major App. Examples of Washers / Collars①

App. Example as Securing Bearing Surface

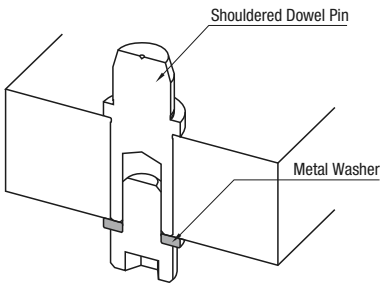
■Bolt fastening is stable.





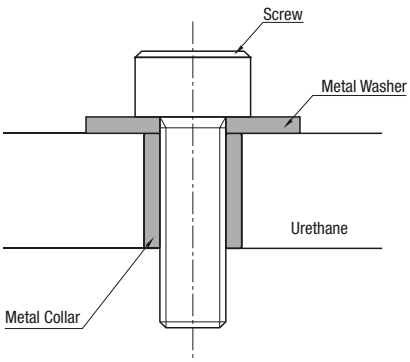
App. Example as Loosening Prevention Mechanism

■By increasing the bearing surface there is larger friction, which makes loosening less likely.



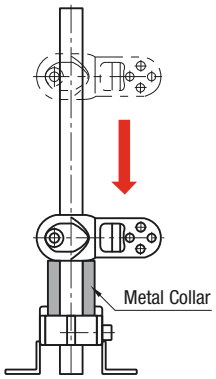
App. Example as Softwood Reinforcement

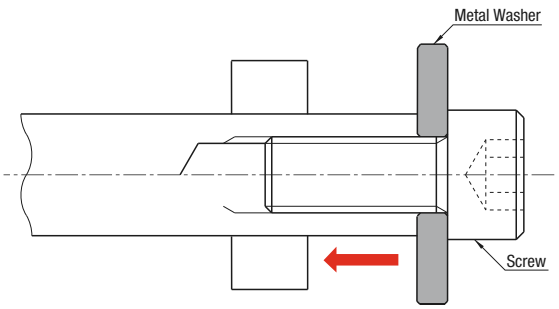
■Prevents the bolt from collapsing.



App. Example as a Stopper

■It can also be used as a fall prevention safety measure.

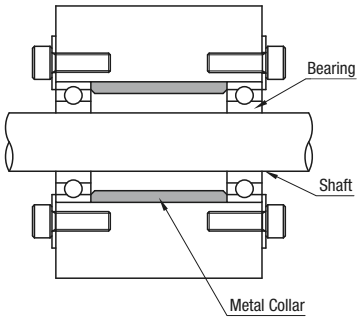




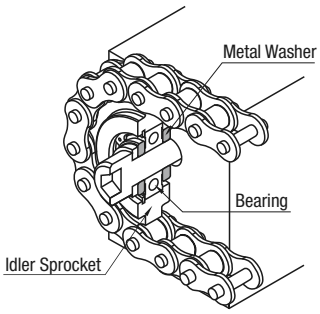
Major App. Examples of Washers / Collars②

App. Example - For Bearing Retention

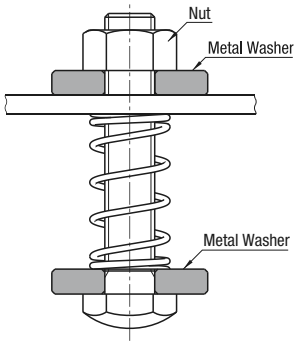
■Used as spacer of the inner ring and the outer ring.

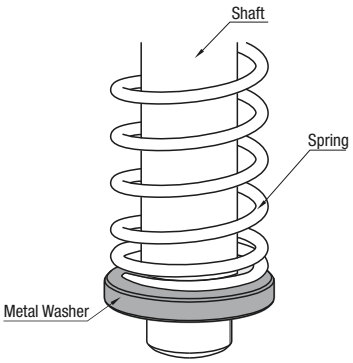


■Used to secure bearing.



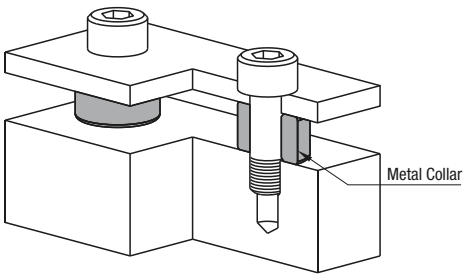
App. Example as Spring Seat

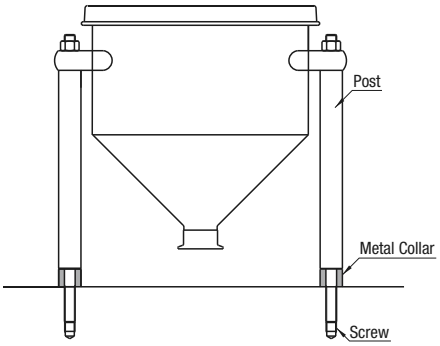




App. Example as Spacer

■Used for height adjustment and raising.





Metal Washers / Collars

	Shape		Size	Ordering Code	Accuracy	Material (Raw Material)	Material (Hardened Products)	Surface Treatment	Catalog Page
Washer	Standard		O.D. D 4~60 I.D. V 2~30 Thickness T 1~10	Selectable	Standard Grade Precision Grade	EN 1.1191 Equiv. (P) Standard Grade is EN 1.1191 Equiv. EN 1.4301 Equiv. (P) Standard Grade is EN 1.4301 Equiv.	EN 1.1191 Equiv. (P) Standard Grade is EN 1.1191 Equiv. EN 1.4031 Equiv.	None Black Oxide Electroless Nickel Plating	P.113 P.114 P.119
			O.D. D 4~30 I.D. V 2~25	Configurable	Standard Grade Precision Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	-	None Black Oxide Electroless Nickel Plating	P.113 P.114
			Thickness T 1~10	0.5mm Increment					
			O.D. D 4~100 I.D. V 0~90 Thickness T 1~10	Dimension Configurable	Standard Grade Precision Grade Tolerance Selection	EN 1.0038 Equiv. EN 1.1191 Equiv. EN 1.4301 Equiv. EN AW-2017 Equiv. Brass (JIS EN CW614N Equiv.)	EN 1.1191 Equiv. EN 1.2510 Equiv. EN 1.4031 Equiv. (P) EN 1.4125 Equiv. for Precision Grade	None Black Oxide Electroless Nickel Plating LTBC Plating Anodize (Clear, Black)	P.115 P.120
	Flanged		D Dim. 5~60 H Dim. 7~70 V Dim. 2~58 L Dim. 2~10	Dimension Configurable	Standard Grade Precision Grade	EN 1.0038 Equiv. EN 1.1191 Equiv. EN 1.4301 Equiv.	EN 1.4031 Equiv. EN 1.2510 Equiv.	None Black Oxide Electroless Nickel Plating	P.122
	Counterbored		O.D. D 10~60	Selectable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	EN 1.1191 Equiv. EN 1.4031 Equiv. (P) EN 1.4125 Equiv. for Precision Grade	None Black Oxide Electroless Nickel Plating	P.123
			I.D. P 3.5~11	-					
			Thickness T 6~20	Selectable					
			O.D. D 10~30	Configurable	Standard Grade Precision Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	-	None Black Oxide Electroless Nickel Plating	P.123
			I.D. P 3.5~9	-					
			Thickness T 3~20	0.5mm Increment					
			O.D. D 10~100 I.D. P 3~88 Thickness T 3~50	Dimension Configurable	Standard Grade Precision Grade	EN 1.1191 Equiv. EN 1.4301 Equiv. EN 1.0038 Equiv. EN AW-2017 Equiv.	EN 1.1191 Equiv. EN 1.4031 Equiv. EN 1.2510 Equiv.	None Black Oxide Electroless Nickel Plating Clear Anodize	P.124
	Tapped		O.D. D 10~60 M Dia. 2~20 Thickness T 3~20	Selectable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	-	None Black Oxide Electroless Nickel Plating	P.125
			O.D. D 6~30 M Dia. 2~12	Configurable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	-	None Black Oxide Electroless Nickel Plating	P.125
			Thickness T 3~20	0.5mm Increment					
			Thickness T 3~50	Dimension Configurable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv. EN AW-2017 Equiv.	-	None Black Oxide Electroless Nickel Plating Clear Anodize	P.125
	Countersunk		O.D. D 14~30 Applicable Countersunk M Dia. 4~10 Thickness T 2.5~8	Selectable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	-	None Black Oxide Electroless Nickel Plating	P.126
			O.D. D 10~60 Applicable Countersunk M Dia. 2~30 Thickness T 2~10	Dimension Configurable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv. EN AW-2017 Equiv.	-	None Black Oxide Electroless Nickel Plating Clear Anodize	
	With Screw Holes		O.D. D 20~80 Applicable Countersunk M Dia. 3~28 Thickness T 1~10	Dimension Configurable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv. EN AW-2017 Equiv.	-	None Black Oxide Electroless Nickel Plating Clear Anodize	P.126
	Shape Selectable		O.D. D 10~50 I.D. V 3~30 Thickness T 3~10	Dimension Configurable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	-	None Black Oxide Electroless Nickel Plating	P.127
Collar	Standard		I.D. V 3~25 O.D. D 5~30 Thickness L 10~35	Selectable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv.	-	None Black Oxide Electroless Nickel Plating	P.131
			O.D. D 4~60 I.D. V 2~30	Configurable	Standard Grade Precision Grade	EN 1.1191 Equiv. EN 1.4301 Equiv. EN AW-2017 Equiv.	-	None Black Oxide Electroless Nickel Plating Clear Anodize	P.132 P.137
			Thickness L 10~100	0.1mm Increment					
			I.D. V 2~90 O.D. D 4~100 Thickness L 10~100	Dimension Configurable	Standard Grade Precision Grade Tolerance Selectable	EN 1.1191 Equiv. EN 1.4301 Equiv. EN 1.0038 Equiv. EN AW-2017 Equiv. Brass (EN CW614N Equiv.)	EN 1.1191 Equiv. EN 1.4031 Equiv. EN 1.2510 Equiv.	None Black Oxide Electroless Nickel Plating LTBC Plating Anodize (Clear, Black)	P.133
	Flanged		I.D. V 2~30	Selectable	Standard Grade	EN 1.1191 Equiv. EN 1.4301 Equiv. EN AW-2017 Equiv.	-	None Black Oxide Electroless Nickel Plating Clear Anodize	P.139
			O.D. D 5~60 Length L 10~100	0.1mm Increment					
			V Dim. 2~55 D Dim. 4~60 H Dim. 6~70 T Dim. 1~20 L Dim. 10~100	Dimension Configurable	Standard Grade Precision Grade	EN 1.1191 Equiv. EN 1.4301 Equiv. EN 1.0038 Equiv. EN AW-2017 Equiv. Brass (EN CW614N Equiv.)	EN 1.1191 Equiv. EN 1.4031 Equiv. EN 1.2510 Equiv.	None Black Oxide Electroless Nickel Plating Anodize (Clear, Black)	P.140
	Thin-Walled Metal Collar		O.D. D 2~7	-	Standard Grade	EN 1.4301 Equiv.	-	None	P.128
			I.D. V 1~5	Selectable					
			Length L 3~20	0.5mm Increment					
	Hollow Collar		O.D. D 10.5~48.6	-	Standard Grade	EN 1.0035 Equiv. EN 1.0254 Equiv. (Sch40/80)	-	None Black Oxide	P.128
			I.D. d 5.7~41.6	-					
			Length L 6~200	0.5mm Increment					

Application Based Product		Features	Catalog Page
Slotted Hole		The slotted hole allows fine-adjustment of bolt position.	P.127
Spacers		Can be used as a reinforcement at the time of tightening the softwood with screw.	P.128
Simultaneous Grinding Spacers		When multiple are used, the height variation is within ±5μ.	P.129
Stepped Spacers		Can be used as cover.	P.130

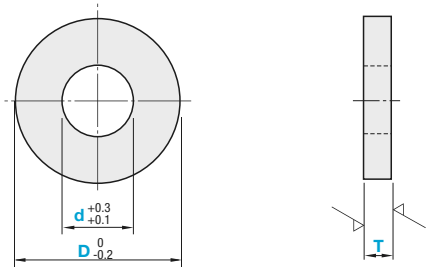
Metal Washers Washers (Bulk Packages)

■Have larger O.D. and are thicker compared to standard washers. As these washers are press finished, they are cheaper than the washers made by cutting.



RoHS

Type	M Material	S Surface Treatment
PACK-PWTB	EN 1.0330 Equiv.	Black Oxide
PACK-PWTM		Electroless Nickel Plating



■T Dimension Tolerance

T Dimension	Tolerance
1	±0.08
2	±0.13
3	±0.15

Part Number		D	T	Unit Price								Pieces in 1 pack
				PACK-PWTB				PACK-PWTM				
				1~4		5~10		1~4		5~10		
Type	d			Price per 1 pc.	1 Pack	Price per 1 pc.	1 Pack	Price per 1 pc.	1 Pack	Price per 1 pc.	1 Pack	
PACK-PWTB PACK-PWTM	3	10	1 2									100 pcs.
	4	10 12	2 3									100 pcs.
	5	12	2 3									100 pcs.
		15	2 3									100 pcs.
	6	20	3									50 pcs.
	8	20	3									50 pcs.
	10	20	3									50 pcs.

Sold by the package only

Ordering Example

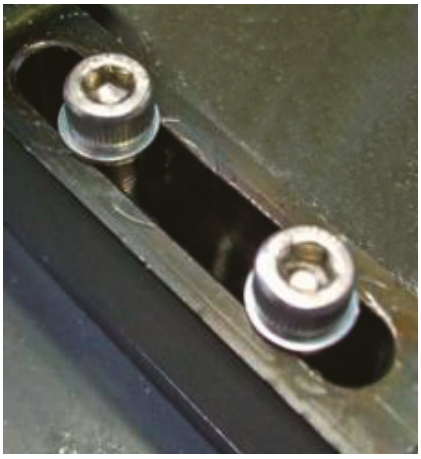
Part Number	-	D	-	T
PACK-PWTB3	-	10	-	1

Example

■Use when screw holes are large.

O.D. is larger as compared to standard washers, and grappling area is larger and hence can be fixed firmly.

Using Standard Washers



Using Metal Washers



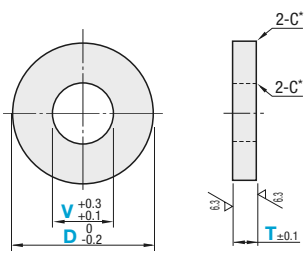
Metal Washer

Standard Grade, T Dimension Selectable / Configurable



Type		Material	Surface Treatment
T Dimension Selectable	T Dimension Configurable		
WSSB	TWSSB	EN 1.1191 Equiv.	Black Oxide
WSSM	TWSSM		Electroless Nickel Plating
WSSS	TWSSS	EN 1.4301 Equiv.	-

Hardened Type P.119
T Dimension Selectable is Material EN 1.1191 Equiv. and EN 1.4301 Equiv.



* D=16 or Less: C0.2 or Less
D=20 or More: C0.5 or Less

T Dimension Selectable (Standard Grade)

Part Number Type	D	V Selection	T Selection	Unit Price WSSB	WSSM	WSSS
WSSB WSSM WSSS	4	2	1 2 / 1.5 2.5			
	5	2 3 / 3	1 2 / 1.5 2.5 3			
	6	2 3 4 / 3 4	1 2 / 1.5 2.5 3 4 5 6			
	8	2 3 4 5 6 / 3 4 5 6	1 2 3 5 / 1.5 2.5 4 6 8			
	10	2 3 4 5 6 8 / 3 4 5 6 8	1 2 3 5 / 1.5 2.5 4 6 8			
	12	3 4 5 6 8 10 / 4 5 6 8 10	1 2 3 5 / 1.5 2.5 4 6 8			
	13	4 5 6 8 10 / 5 6 8 10 / 6 8 10	1 2 3 5 / 1.5 2.5 / 4 6 8			
	14	4 5 6 8 10 / 5 6 8 10 / 6 8 10	1 2 3 5 / 1.5 2.5 / 4 6 8			
	15	4 5 6 8 10 12 / 5 6 8 10 12	1 2 3 5 / 1.5 2.5 / 4 6 8			
	16	4 5 6 8 10 12 / 6 8 10 12	1 2 3 5 / 1.5 2.5 4 6 8			
	20	4 5 6 8 10 12 15 16 / 6 8 10 12 15	1 2 3 5 / 1.5 2.5 4 6 8			
	25	6 8 10 12 15 16 20	2 3 5 / 1 4 6 8			
	30	8 10 12 15 16 20 25	2 3 5 / 1 4 6 8			
	35	10 12 15 16 20 25	3 5 10			
	40	10 12 15 16 20 25 30	3 5 10			
	50	10 12 15 16 20 25 30	3 5 10			
	60	15 16 20 25 30	3 5 10			

Ordering Example: Part Number - V - T
WSSS14 - 10 - 5

T Dimension Configurable (Standard Grade)

Part Number Type	D	V Selection	T 0.5mm Increment
TWSSB TWSSM TWSSS	4	2	1.0~10.0
	5	2 3	
	6	2 3 4	
	8	2 3 4 5 6	
	10	2 3 4 5 6 8	
	12	3 4 5 6 8 10	
	13	4 5 6 8 10	
	14	4 5 6 8 10	
	15	4 5 6 8 10 12	
	16	4 5 6 8 10 12	
	20	4 5 6 8 10 12 15 16	
	25	6 8 10 12 15 16 20	
	30	8 10 12 15 16 20 25	

D	T	Unit Price TWSSB	TWSSM	TWSSS
4~10	1.0~ 2.0			
	2.5~ 5.0			
	5.5~10.0			
12~20	1.0~ 2.0			
	2.5~ 5.0			
	5.5~10.0			
25, 30	1.0~ 2.0			
	2.5~ 5.0			
	5.5~10.0			

Ordering Example: Part Number - V - T
TWSSB30 - 8 - 5.5

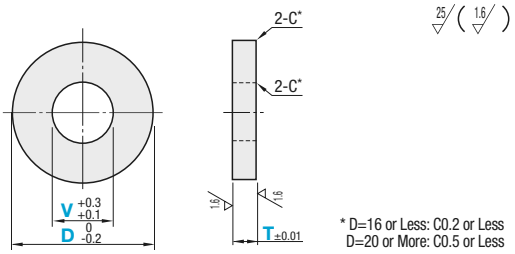
Metal Washer

Precision Grade, T Dimension Selectable / Configurable



Type		Material	Surface Treatment
T Dimension Selectable	T Dimension Configurable		
WASB	TWASB	EN 1.1191 Equiv.	Black Oxide
WASM	TWASM		Electroless Nickel Plating
WASS	TWASS	EN 1.4301 Equiv.	-

Hardened Type P.119



* D=16 or Less: C0.2 or Less
D=20 or More: C0.5 or Less

T Dimension Selectable (Precision Grade)

Part Number Type	D	V Selection	T Selection	Unit Price WASB	WASM	WASS
WASB WASM WASS	4	2	1 2			
	5	2 3	1 2			
	6	2 3 4	1 2			
		3 4	1.5			
	8	2 3 4 5 6	1 2 3 5			
		3 4 5 6	1.5			
	10	2 3 4 5 6 8	1 2 3 5			
		4 5 6 8	1.5 2.5			
	12	3 4 5 6 8 10	1 2 3 5			
		5 6 8 10	1.5 2.5			
	13	4 5 6 8 10	1 2 3 5			
		6 8	1.5 2.5			
	14	4 5 6 8 10	1 2 3 5			
		6 8 10	1.5			
	15	4 5 6 8 10 12	1 2 3 5			
		6 8 10 12	1.5			
	16	4 5 6 8 10 12	1 2 3 5			
		6 8 10 12	1.5			
	20	4 5 6 8 10 12 15 16	2 3 5			
		6 10 15	1.5 2.5			
	25	6 8 10 12 15 16 20	2 3 5			
	30	8 10 12 15 16 20 25	2 3 5			
	35	10 12 15 16 20 25	3 5 10			
	40	10 12 15 16 20 25 30	3 5 10			
	50	10 12 15 16 20 25 30	3 5 10			
	60	15 16 20 25 30	3 5 10			

Ordering Example: Part Number - V - T
WASB14 - 10 - 5

T Dimension Configurable (Precision Grade)

Part Number Type	D	V Selection	T 0.5mm Increment
TWASB TWASM TWASS	4	2	1.0~10.0
	5	2 3	
	6	2 3 4	
	8	2 3 4 5 6	
	10	2 3 4 5 6 8	
	12	3 4 5 6 8 10	
	13	4 5 6 8 10	
	14	4 5 6 8 10	
	15	4 5 6 8 10 12	
	16	4 5 6 8 10 12	
	20	4 5 6 8 10 12 15 16	
	25	6 8 10 12 15 16 20	
	30	8 10 12 15 16 20 25	

D	T	Unit Price TWASB	TWASM	TWASS
4~10	1.0~ 2.0			
	2.5~ 5.0			
	5.5~10.0			
12~20	1.0~ 2.0			
	2.5~ 5.0			
	5.5~10.0			
25, 30	1.0~ 2.0			
	2.5~ 5.0			
	5.5~10.0			

Ordering Example: Part Number - V - T
TWASB30 - 8 - 5.5

Metal Washer

Standard / Precision Grade, Dimension Configurable



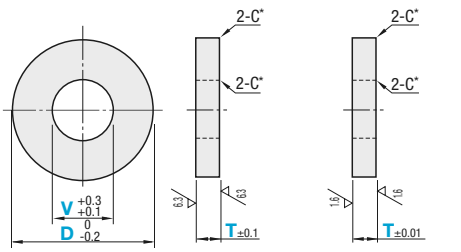
RoHS

Part Number		Material	Surface Treatment
Standard Grade	Precision Grade		
FWS	FWAS	EN 1.0038 Equiv.	-
FWSSC	FWASC	EN 1.1191 Equiv.	-
FWSSB	FWASB		Black Oxide
FWSSM	FWASM		Electroless Nickel Plating
FWSSR	FWASR		LTBC Plating
FWSSA	FWASA	Aluminum Alloy 2000 series	Clear Anodize
FWSSAB	-		Black Anodize
FWSBB	-	Brass (JIS EN CW614N Equiv.)	-
FWSSS	FWASS	EN 1.4301 Equiv.	-
FWSSSR	FWASSR		LTBC Plating
FWSUS	FWASU	EN 1.4401 Equiv.	-

Hardened Type P.120

25 (6.3 1.6)

* D=16 or Less: C0.2 or Less
D=16.5 or More: C0.5 or Less



Standard Grade

Part Number	D	V 0.5mm Increment (V3 or More)	T 0.1mm Increment	Unit Price										
				FWS	FWSSC	FWSSB	FWSSM	FWSSR	FWSSA	FWSSAB	FWSBB	FWSSS	FWSSSR	FWSUS
FWS FWSSC FWSSB FWSSM FWSSR FWSSA FWSSAB FWSBB FWSSS FWSSSR FWSUS	4.0~10.0 0.5mm Increment	0 (No Hole Machining) (Selection) 2.0 2.6 (0.5mm Increment) 3.0 ~ 90.0	1.0~ 2.0											
			2.1~ 5.0											
			5.1~ 10.0											
	10.5~20.0 0.5mm Increment		1.0~ 2.0											
			2.1~ 5.0											
			5.1~ 10.0											
	21~30 1mm Increment		1.0~ 2.0											
			2.1~ 5.0											
			5.1~ 10.0											
	31~40 1mm Increment		1.0~ 2.0											-
			2.1~ 5.0											-
			5.1~ 10.0											-
	41~50 1mm Increment		1.0~ 2.0											-
			2.1~ 5.0											-
			5.1~ 10.0											-
	51~60 1mm Increment		1.0~ 2.0											-
			2.1~ 5.0											-
			5.1~ 10.0											-
	61~80 1mm Increment		5.0~ 10.0											-
	81~100 1mm Increment		5.0~ 10.0											-

Material: EN AW-2017 Equiv., EN 1.4401 Equiv., Brass··· T≥2
No specification available for sizes without declaration of value.

D / V Machining Conditions
D≤60··· V≤D-2
D≥61··· V≤D-4

D / V Machining Conditions of Material EN AW-2017 Equiv.
4≤D≤ 10 ··· V≤D- 2
10.5≤D≤ 30 ··· V≤D- 4
31≤D≤ 60 ··· V≤D- 6
61≤D≤ 80 ··· V≤D- 8
81≤D≤100 ··· V≤D-10

Ordering Example

Part Number	-	D	-	V	-	T
FWSSC	-	D71	-	V50.0	-	T10.0

■Precision Grade

Part Number	D	V 0.5mm Increment (V3 or More)	T 0.1mm Increment	Unit Price								
				FWAS	FWASC	FWASB	FWASM	FWASR	FWASA	FWASS	FWASSR	FWASU
FWAS FWASC FWASB FWASM FWASR FWASA FWASS FWASSR FWASU	4.0~10.0 0.5mm Increment	0 (No Hole Machining) (Selection) 2.0 2.6 (0.5mm Increment) 3.0 ~ 90.0	1.0~ 2.0									
			2.1~ 5.0									
			5.1~ 10.0									
	10.5~20.0 0.5mm Increment		1.0~ 2.0									
			2.1~ 5.0									
			5.1~ 10.0									
	21~30 1mm Increment		1.0~ 2.0									
			2.1~ 5.0									
			5.1~ 10.0									
	31~40 1mm Increment		1.0~ 2.0									-
			2.1~ 5.0									-
			5.1~ 10.0									-
	41~50 1mm Increment		1.0~ 2.0									-
			2.1~ 5.0									-
			5.1~ 10.0									-
	51~60 1mm Increment		1.0~ 2.0									-
			2.1~ 5.0									-
			5.1~ 10.0									-
	61~80 1mm Increment		5.0~ 10.0						-	-	-	-
	81~100 1mm Increment		5.0~ 10.0						-	-	-	-

Material: EN AW-2017 Equiv., EN 1.4401 Equiv.···› T≥2
No specification available for sizes without declaration of value.

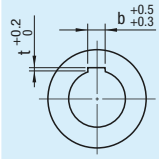
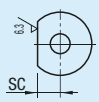
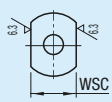
D / V Machining Conditions
D≤60···› V≤D-2
D≥61···› V≤D-4

D / V Machining Conditions of Material EN AW-2017 Equiv.
4≤D≤ 10 ···› V≤D- 2
10.5≤D≤ 30 ···› V≤D- 4
31≤D≤ 60 ···› V≤D- 6
61≤D≤ 80 ···› V≤D- 8
81≤D≤100 ···› V≤D-10

Ordering Example: Part Number - D - V - T
FWASB - D15.5 - V5.5 - T2.6

Alterations (Ordering Example: Part Number - D - V - T - (KC, SC, WSC, VKC, DKC, HKC))
FWASS - D20 - V10 - T5 - VKC

When both I.D. / O.D. tolerance changes are specified, the concentricity is Ø0.02.

Alterations	Code	Spec.
Keyway Relief 	KC	Adds an keyway relief. Ordering Code KC Machining Conditions V≥8 Not available for D61 ~ 100.
One Flat 	SC	Adds a flat. Ordering Code SC10 SC=1mm Increment SC≥V/2+2 Not available for D4 ~ 8.
Two Flats 	WSC	Adds two flats. Ordering Code WSC10 WSC=1mm Increment WSC≥V+4 Not available for D4 ~ 8.

V	b	t	D-V
8 ~10.5	3	2.0	7 or More
11~12.5	4	2.5	8 or More
13~17.5	5	3.0	10 or More
18~22.5	6	3.5	12 or More
23~30.5	8	4.0	14 or More
31~38.5	10	4.0	14 or More
39~42.5	12	4.0	14 or More
43~44.0	14	4.5	16 or More

Alterations	Code	Spec.
I.D. Tolerance 	VKC	Changes the I.D. Tolerance to H7. Ordering Code VKC Machining Conditions D≥6 V≥3 Not applicable for FWSSAB.
O.D. Tolerance 	DKC (g6) HKC (h7)	Changes the O.D. Tolerance to g6 or h7. Ordering Code DKC, HKC Machining Conditions When D≥43, T≥1.5. D≥6 Not applicable for FWSSAB.

D	D-V
6~10	D-V≥2
10.5~20	D-V≥3
21~30	D-V≥6
31~40	D-V≥8
41~50	D-V≥10
51~60	D-V≥12
61~70	D-V≥14
71~80	D-V≥16
81~90	D-V≥18
91~100	D-V≥20

Metal Washer

Standard / Precision Grade I.D. / O.D. Tolerance Selectable / Dimension Configurable



RoHS

Part Number		M Material	S Surface Treatment
Standard Grade	Precision Grade		
SWSC	SWMC	EN 1.1191 Equiv.	-
SWSB	SWMB		Black Oxide
SWSM	SWMM		Electroless Nickel Plating
SWSS	SWMS	EN 1.4301 Equiv.	-

D	T D Tolerance Selection			
	G	H	N	X
	g6	h7	-	-
5.0~8.5	-	-	-0.1 -0.3	0 -0.2
9.0~10.0	-0.005 -0.014	0 -0.015		
10.5~18.0	-0.006 -0.017	0 -0.018		
18.5~30	-0.007 -0.020	0 -0.021		
31~50	-0.009 -0.025	0 -0.025		
51~60	-0.010 -0.029	0 -0.030		

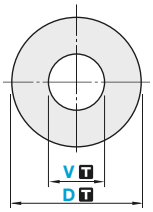
V	T V Tolerance Selection		
	H	N	X
	H7	-	-
3.0	+0.010 0	+0.3 +0.1	+0.2 0
3.5~6.0	+0.012 0		
6.5~10.0	+0.015 0		
10.5~18.0	+0.018 0		
18.5~30.0	+0.021 0		
30.5~50.0	+0.025 0		
50.5~58.0	+0.030 0		

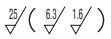
■I.D./O.D. Tolerance Price Number List

D (O.D.)	V (I.D.)	Price No.
G	H	②
	N	①
	X	①
H	H	②
	N	①
	X	①
N	H	①
	N	③
	X	③
X	H	①
	N	③
	X	③

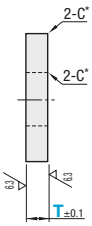
• Guide to Price List
<Ex.> When ordering Material EN 1.1191 Equiv., O.D. g6, I.D. H7 and L Tolerance When ordering Material EN 1.1191 Equiv., O.D. g6, I.D. H7 and L Tolerance ±0.01
Product Number:
SWMC–GH–D10.0–V4.0–T1.0

1. Check the I.D. / O.D. Tolerance Price Number List. (GH is Price Number ②)
2. In the price list of precision grade, find the column of I.D. / O.D. tolerance price ② shown in the price list of precision grade.

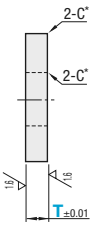




Standard Grade



Precision Grade



*D=16 or Less: C0.2 or Less
D=16.5 or More: C0.5 or Less

■Standard Grade

Part Number	D Tolerance Selection	V Tolerance Selection	D	V 0.5mm Increment	T 0.1mm Increment	Unit Price											
						SWSC			SWSB			SWSM			SWSS		
						Tolerance ①	Tolerance ②	Tolerance ③	Tolerance ①	Tolerance ②	Tolerance ③	Tolerance ①	Tolerance ②	Tolerance ③	Tolerance ①	Tolerance ②	Tolerance ③
SWSC SWSB SWSM SWSS	G H N X	H N X	5.0~10.0 0.5mm Increment	3.0~58.0 (V≤D-2) Refer to the following.	1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			10.5~20.0 0.5mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			21~30 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			31~40 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			41~50 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			51~60 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												

Refer to the following.
T≥3 for SWSS
No specification available for sizes without declaration of value.

D≥9 is applicable when G or H is selected as the tolerance values of D and V. The dimension ranges of V and T are shown in the table below.

D	V	T
9~30	D-V≥6	1~10
31~60	D-V≥12	2~10

Ordering Example

Part Number - Tolerance Selection - D - V - T
D V

SWSC - G H - D10.0 - V4.0 - T1.0

■Precision Grade

Part Number	D Tolerance Selection	V Tolerance Selection	D	V 0.5mm Increment	T 0.1mm Increment	Unit Price											
						SWMC			SWMB			SWMM			SWMS		
						Tolerance ①	Tolerance ②	Tolerance ③	Tolerance ①	Tolerance ②	Tolerance ③	Tolerance ①	Tolerance ②	Tolerance ③	Tolerance ①	Tolerance ②	Tolerance ③
SWMC SWMB SWMM SWMS	G H N X	H N X	5.0~10.0 0.5mm Increment	3.0~58.0 (V≤D-2) Refer to the following.	1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			10.5~20.0 0.5mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			21~30 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			31~40 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			41~50 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												
			51~60 1mm Increment		1.0~ 2.9										-	-	-
					3.0~ 5.0												
					5.1~10.0												

Ⓟ T≥3 for SWMS

Ⓟ No specification available for sizes without declaration of value.

Ⓟ D≥9 is applicable when G or H is selected as the tolerance values of D and V. The dimension ranges of V and T are shown in the table below.

D	V	T
9~30	D-V≥6	1~10
31~60	D-V≥12	2~10

Ordering Example

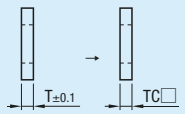
Part Number - Tolerance Selection (D V) - D - V - T

SWMC - G H - D10.0 - V4.0 - T1.0

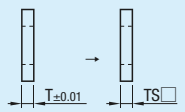
Alterations

Part Number - Tolerance Selection (D V) - D - V - T - (TSB, TSC, TSD, TSE)

SWMC - G H - D10.0 - V4.0 - T1.0 - TSB

Alterations	Negative Tolerance	Positive Tolerance	Zero, Negative Tolerance	Zero, Positive Tolerance
Code	TCB	TCC	TCD	TCE
 Ⓟ Applicable to Standard Grade.	Changes thickness tolerance (T). T -0.1 -0.3 Ordering Code TCB	Changes thickness tolerance (T). T +0.3 +0.1 Ordering Code TCC	Changes thickness tolerance (T). T 0 -0.2 Ordering Code TCD	Changes thickness tolerance (T). T +0.2 0 Ordering Code TCE

Standard Grade T Tolerance

Alterations	Negative Tolerance	Positive Tolerance	Zero, Negative Tolerance	Zero, Positive Tolerance
Code	TSB	TSC	TSD	TSE
 Ⓟ Applicable to Precision Grade.	Changes thickness tolerance (T). T -0.01 -0.03 Ordering Code TSB	Changes thickness tolerance (T). T +0.03 +0.01 Ordering Code TSC	Changes thickness tolerance (T). T 0 -0.02 Ordering Code TSD	Changes thickness tolerance (T). T +0.02 0 Ordering Code TSE

Precision Grade T Tolerance

Metal Washer

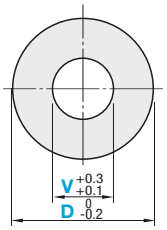
Hardened Type, Standard Grade / Precision Grade, T Dimension Selectable



RoHS

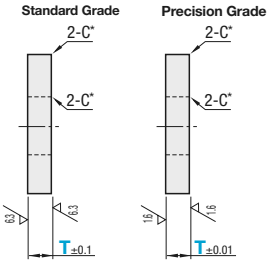
Part Number		M Material	S Surface Treatment	H Hardness
Standard Grade	Precision Grade			
WSSBH	WASBH	EN 1.1191 Equiv.	Black Oxide	45~50HRC
WSSMH	WASMH		Electroless Nickel Plating	
WSSSH	WASSH	EN 1.4031 Equiv.	-	

Standard Grade is EN 1.1191 Equiv.
Depending on thickness and length, EN 1.1191 Equiv. Hardened Type may be less than 45HRC.
Stainless Steel Hardened Type (WSSSH, WASSH) may be discolored by hardening.



25 (6.3 1.6)

* D=16 or Less: C0.2 or Less
D=20 or More: C0.5 or Less



Part Number		V Selection	T Selection	Unit Price					
				Standard Grade			Precision Grade		
Type	D			WSSBH	WSSMH	WSSSH	WASBH	WASMH	WASSH
	4	2	1 2						
	5	2 3	1 2						
	6	2 3 4	1 2						
	8	2 3 4 5 6	1 2 3 5						
	10	2 3 4 5 6 8	1 2 3 5						
Standard Grade	12	3 4 5 6 8 10	1 2 3 5						
WSSBH	13	4 5 6 8 10	1 2 3 5						
WSSMH	14	4 5 6 8 10	1 2 3 5						
WSSSH	15	4 5 6 8 10 12	1 2 3 5						
Precision Grade	16	4 5 6 8 10 12	1 2 3 5						
WASBH	20	4 5 6 8 10 12 15 16	2 3 5						
WASMH	25	6 8 10 12 15 16 20	2 3 5						
WASSH	30	8 10 12 15 16 20 25	2 3 5						
	35	10 12 15 16 20 25	3 5 10						
	40	10 12 15 16 20 25 30	3 5 10						
	50	10 12 15 16 20 25 30	3 5 10						
	60	15 16 20 25 30	3 5 10						

Ordering Example

Part Number	-	V	-	T
WASBH14	-	10	-	5

Metal Washer

Hardened Type, Standard Grade / Precision Grade, Dimension Configurable

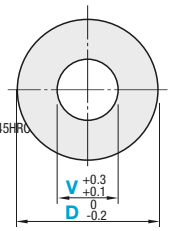


RoHS

Part Number		Material	Surface Treatment	Hardness
Standard Grade	Precision Grade			
FWSSCH	FWASCH	EN 1.1191 Equiv.	-	45~50HRC
FWSSBH	FWASBH		Black Oxide	
FWSSMH	FWASMH		Electroless Nickel Plating	
FWSSK	FWASK	EN 1.2510 Equiv.	-	55HRC~
FWSSKB	FWASKB		Black Oxide	
FWSSKM	FWASKM		Electroless Nickel Plating	
FWSSSH	FWASSH	EN 1.4031 Equiv.	-	45~50HRC
FWSSSHR	-		LTBC Plating	

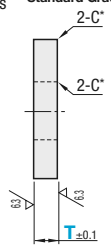
Depending on thickness and length, EN 1.1191 Equiv. Hardened Type may be less than 45HRC.
Stainless Steel Hardened Type (FWSSSH, FWASSH) may be discolored by hardening.

* D=16 or Less: C0.2 or Less
D=20 or More: C0.5 or Less

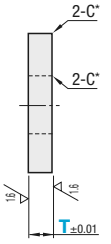


25 (6.3 1.6)

Standard Grade



Precision Grade



Part Number	D	V 0.5mm Increment (V3 or More)	T 0.1mm Increment	Unit Price										
				Standard Grade						Precision Grade				
				FWSSCH	FWSSBH FWSSMH	FWSSK	FWSSKB FWSSKM	FWSSSH	FWSSSHR	FWASCH	FWASBH FWASMH	FWASK	FWASKB FWASKM	FWASSH
Standard Grade FWSSCH FWSSBH FWSSMH FWSSK FWSSKB FWSSKM FWSSSH FWSSSHR Precision Grade FWASCH FWASBH FWASMH FWASK FWASKB FWASKM FWASSH	4.0~10.0 0.5mm Increment	0 (No Hole Machining) (Selection) 2.0 2.6 (0.5mm Increment) 3.0 ~ 90.0	1.0~ 2.0											
			2.1~ 5.0											
			5.1~10.0											
	10.5~20.0 0.5mm Increment		1.0~ 2.0											
			2.1~ 5.0											
			5.1~10.0											
	21~30 1mm Increment		1.0~ 2.0											
			2.1~ 5.0											
			5.1~10.0											
	31~40 1mm Increment		1.0~ 2.0											
			2.1~ 5.0											
			5.1~10.0											
	41~50 1mm Increment		1.0~ 2.0											
			2.1~ 5.0											
			5.1~10.0											
	51~60 1mm Increment		1.0~ 2.0											
			2.1~ 5.0											
			5.1~10.0											
	61~80 1mm Increment		5.0~10.0									-	-	-
	81~100 1mm Increment		5.0~10.0									-	-	-

D / V Machining Conditions
D≤60···V≤D-2
D≥61···V≤D-4

D / V Machining Conditions of Material EN 1.2510 Equiv.
4≤D≤10···V≤D-2
10.5≤D≤30···V≤D-4
31≤D≤60···V≤D-6
61≤D≤ 80···V≤D-8
81≤D≤100···V≤D-10

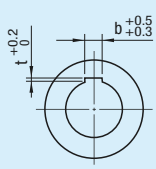
No specification available for sizes without declaration of value.

Ordering Example

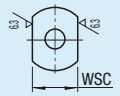
Part Number	-	D	-	V	-	T
FWSSKB	-	D71	-	V50.0	-	T10.0

Alterations

Part Number	-	D	-	V	-	T	-	(KC, SC, WSC)
FWSSBH	-	D20	-	V10	-	T5	-	KC

Alterations	Code	Spec.
Keyway Relief 	KC	Adds an keyway relief. Ordering Code KC Machining Conditions V≥8 Not available for D61 ~ 100.

V	b	t	D-V
8 ~10.5	3	2.0	7 or More
11~12.5	4	2.5	8 or More
13~17.5	5	3.0	10 or More
18~22.5	6	3.5	12 or More
23~30.5	8	4.0	14 or More
31~38.5	10	4.0	14 or More
39~42.5	12	4.0	14 or More
43~44.0	14	4.5	16 or More

Alterations	Code	Spec.
One Flat 	SC	Adds a flat. Ordering Code SC10 SC=1mm Increment SC≥V/2+2 Not available for D4 ~ 8.
Two Flats 	WSC	Adds two flats. Ordering Code WSC10 WSC=1mm Increment WSC≥V+4 Not available for D4 ~ 8.

Metal Washer

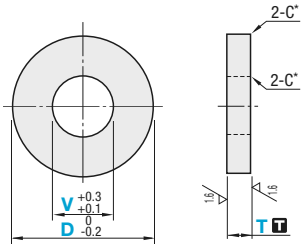
Standard Grade / Precision Grade / High Precision Grade I.D. / O.D. Tolerance Selectable / Dimension Configurable



RoHS

Part Number	M Material	S Surface Treatment	H Hardness
AWSC	EN 1.1191 Equiv.	-	-
AWSB		Black Oxide	
AWSM		Electroless Nickel Plating	
AWSS	EN 1.4301 Equiv.	-	
AWSH	EN 1.4031 Equiv.	-	45~50HRC

Stainless Steel Hardened Type (AWSH) may be discolored due to hardening.



T T Dimension Tolerance Selection Table			
A	±0.005	-	-
B	-0.1 -0.3	SB	-0.01 -0.03
C	+0.3 +0.1	SC	+0.03 +0.01
D	0 -0.2	SD	0 -0.02
E	+0.2 0	SE	+0.02 0

25 (1.6)

*D=16 or Less: C0.2 or Less
D=16.5 or More: C0.5 or Less

I.D./O.D. Tolerance Selectable, Dimension Configurable

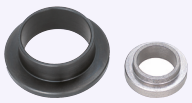
Part Number	T Tolerance Selection	D	V 0.5mm Increment	T 0.1mm Increment	Unit Price														
					High Precision Grade - Tolerance A				Standard Grade - Tolerance B~E					Precision Grade - Tolerance SB~SE					
					AWSC	AWSB	AWSM	AWSH	AWSC	AWSB	AWSM	AWSS	AWSH	AWSC	AWSB	AWSM	AWSS	AWSH
AWSC AWSB AWSM AWSS AWSH	High Precision Grade A; Standard Grade B C D E; Precision Grade SB SC SD SE	5.0~10.0 0.5mm Increment	3.0~58.0	1.0~ 2.9															
				3.0~ 5.0															
				5.1~10.0															
		10.5~20.0 0.5mm Increment		1.0~ 2.9															
				3.0~ 5.0															
				5.1~10.0															
		21~30 1mm Increment		1.0~ 2.9															
				3.0~ 5.0															
				5.1~10.0															
		31~40 1mm Increment		1.0~ 2.9															
				3.0~ 5.0															
				5.1~10.0															
		41~50 1mm Increment		1.0~ 2.9															
				3.0~ 5.0															
				5.1~10.0															
		51~60 1mm Increment		1.0~ 2.9															
				3.0~ 5.0															
				5.1~10.0															

D≤60···V≤D-2 D≥61···V≤D-4 High Precision Grade (Tolerance A) is not available for AWSS.

Ordering Example

Part Number	-	T Tolerance Selection	-	D	-	V	-	T
AWSB	-	B	-	D20.0	-	V8.0	-	T5.0
AWSS	-	SB	-	D20.0	-	V8.0	-	T5.0

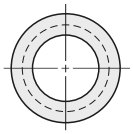
Metal Washer
Flanged

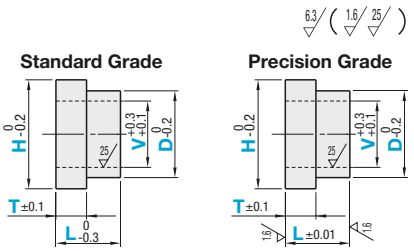


RoHS

Part Number		Material	Surface Treatment	Hardness
Standard Grade	Precision Grade			
FTCSS	-	EN 1.0038 Equiv.	-	-
FTCC	FTCMC	EN 1.1191 Equiv.	-	-
FTCB	FTCMB		Black Oxide	
FTCM	FTCMM		Electroless Nickel Plating	
FTCSK	-	EN 1.2510 Equiv.	-	55HRC~
FTCSKB			Black Oxide	
FTCSKM			Electroless Nickel Plating	
FTCS	FTCMS	EN 1.4031 Equiv.	-	45~50HRC

Stainless Steel Hardened Type (FTCS, FTCMS) may be discolored by hardening.





Circumference C0.5 or Less

Circumference C0.5 or Less

Standard Grade / Precision Grade

Part Number		D	H	V 0.5mm Increment (V3 or More)	T 0.1mm Increment	L 0.1mm Increment	Unit Price											
							Standard Grade								Precision Grade			
Standard Grade	Precision Grade						FTCSS	FTCC	FTCB	FTCM	FTCSK	FTCSKB	FTCSKM	FTCS	FTCMC	FTCMB	FTCMM	FTCMS
FTCSS	FTCMC	5.0~9.0 (0.5mm Increment)	7.0~12.0 (0.5mm Increment)	(Selection) 2.0 2.6 (0.5mm Increment) 3.0~58.0	1.0~8.0	2.0~10.0												
FTCC	FTCMB	9.5~20.0 (0.5mm Increment)	11.5~25.0 (0.5mm Increment)															
FTCB	FTCMM	21~30 (1mm Increment)	23~40 (1mm Increment)															
FTCM	FTCMS	31~40 (1mm Increment)	33~50 (1mm Increment)															
FTCSK		41~50 (1mm Increment)	43~60 (1mm Increment)															
FTCSKB																		
FTCSKM																		
FTCS		51~60 (1mm Increment)	53~70 (1mm Increment)															

Machining Conditions T≤L-1

D	H	V
For 5 ~ 20	D+2≤H≤Dx1.5	V≤D-2
For 21 ~ 40	D+2≤H≤Dx1.4	V≤D-4
For 41 ~ 60	D+2≤H≤Dx1.2	V≤D-6

Machining Conditions of Material EN 1.2510 Equiv. (FTCSK, FTCSKB, FTCSKM) 2≤T≤L-2

D	H	V
For 5 ~ 10	D+2≤H≤Dx1.4	V≤D-2
For 10.5 ~ 30		V≤D-4
For 31 ~ 60	D+2≤H≤Dx1.2	V≤D-6

Ordering Example: Part Number - D - H - V - T - L
FTCMS - D25 - H30 - V8.0 - T2.0 - L5.0

Alterations: Part Number - D - H - V - T - L - (TCB, TCC, TCD, TCE, TSA, TSB, TSC, TSD, TSE, VKC, DKC, HKC)
FTCMM - D25 - H30 - V8.0 - T2.0 - L5.0 - TSC - VKC

When both I.D./O.D. tolerance changes are specified, the concentricity is Ø0.02. Not applicable to the Hardened Products.

Alterations	Code	Spec.
I.D. Tolerance	VKC	Changes the I.D. Tolerance to H7. Ordering Code VKC Machining Conditions D≥6 V≥3



D	D-V
6~10	D-V≥2
10.5~20	D-V≥3
21~30	D-V≥6
31~40	D-V≥8
41~50	D-V≥10
51~60	D-V≥12

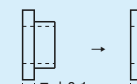
Alterations	Code	Spec.
O.D. Tolerance	DKC (g6) HKC (h7)	Changes the O.D. Tolerance to g6 or h7. Ordering Code DKC, HKC Machining Conditions When D≥43, T≥1.5. D≥6



D	D-V
6~10	D-V≥2
10.5~20	D-V≥3
21~30	D-V≥6
31~40	D-V≥8
41~50	D-V≥10
51~60	D-V≥12

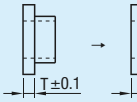
Not applicable to the Hardened Products (FTCSK, FTCSKB, FTCSKM, FTCS, FTCMS).

Standard Grade T Tolerance	Alterations / Code	Negative Tolerance TCB	Positive Tolerance TCC	Zero, Negative Tolerance TCD	Zero, Positive Tolerance TCE
		Changes shoulder thickness tolerance (T). T -0.1 -0.3	Changes shoulder thickness tolerance (T). T +0.3 +0.1	Changes shoulder thickness tolerance (T). T 0 -0.2	Changes shoulder thickness tolerance (T). T +0.2 0
		Ordering Code TCB	Ordering Code TCC	Ordering Code TCD	Ordering Code TCE



Applicable to Standard Grade.

Precision Grade T Tolerance	Alterations / Code	Shoulder Thickness Tolerance TSA	Negative Tolerance TSB	Positive Tolerance TSC	Zero, Negative Tolerance TSD	Zero, Positive Tolerance TSE
		Changes shoulder thickness tolerance (T). T ±0.025	Changes shoulder thickness tolerance (T). T -0.01 -0.06	Changes shoulder thickness tolerance (T). T +0.06 +0.01	Changes shoulder thickness tolerance (T). T 0 -0.05	Changes shoulder thickness tolerance (T). T +0.05 0
		Ordering Code TSA	Ordering Code TSB	Ordering Code TSC	Ordering Code TSD	Ordering Code TSE



Applicable to Precision Grade.

Metal Washer
Counterbored

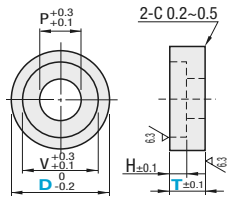


RoHS

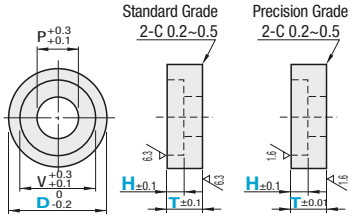
Standard Grade T Tolerance±0.1			Precision Grade T Tolerance±0.01		M Material	S Surface Treatment	H Hardness
T Dimension Selectable	T Dimension Configurable	Dimension Configurable	T Dimension Configurable	Dimension Configurable			
-	-	FWZASS	-	-	EN 1.0038 Equiv.	-	-
-	-	FWZAC	-	FWZSC	EN 1.1191 Equiv.	-	-
WZAB	TWZAB	FWZAB	TWZSB	FWZSB		Black Oxide	-
WZAM	TWZAM	FWZAM	TWZSM	FWZSM		Electroless Nickel Plating	
-	-	FWZAA	-	-	Aluminum Alloy 2000 series	Clear Anodize	-
		FWZAAB				Black Anodize	
WZAS	TWZAS	FWZAS	TWZSS	FWZSS	EN 1.4301 Equiv.	-	-
-	-	FWZACH	-	-	EN 1.1191 Equiv.	-	45~50HRC
WZABH		FWZABH				Black Oxide	
WZAMH		FWZAMH				Electroless Nickel Plating	
-	-	FWZASK	-	-	EN 1.2510 Equiv.	-	55HRC~
		FWZASKB				Black Oxide	
		FWZASKM				Electroless Nickel Plating	
WZASH	-	FWZASH	-	-	EN 1.4031 Equiv.	-	45~50HRC

Depending on thickness and length, EN 1.1191 Equiv. Hardened Type may be less than 45HRC. Stainless Steel Hardened Type (WZASH, FWZASH) may be discolored by hardening.

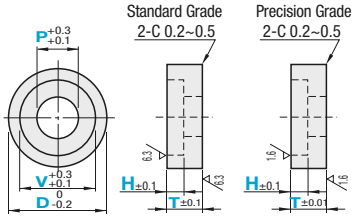
T Dimension Selectable



T Dimension Configurable



Dimension Configurable



25 (1.6 6.3)

■T Dimension Selectable

Part Number Type	D	H	T Selection	V	P	Unit Price WZAB	WZAM	WZAS	WZABH	WZAMH	WZASH
WZAB WZAM WZAS WZABH WZAMH WZASH	10	4	6 8 10	6	3.5						
	12	5	8 10	8	4.5						
	14	6	8 10	10	5.5						
	15	8	10 12	11	6.5						
	20	8	10 12 15								
	30	10	12 15	14	9						
	40	12	15 20	18	11						
	50	12	15 20								
	60	12	15 20								

■T Dimension Configurable

Part Number Type	D	H 0.5mm Increment	T 0.5mm Increment	V	P	Unit Price Standard Grade TWZAB	TWZAM	TWZAS	Precision Grade TWZSB	TWZSM	TWZSS
Standard Grade TWZAB TWZAM TWZAS Precision Grade TWZSB TWZSM TWZSS	10	1.0~18.0	3.0~10.0	6	3.5						
			10.5~20.0								
	12		3.0~10.0	8	4.5						
			10.5~20.0								
	14		3.0~10.0	10	5.5						
			10.5~20.0								
	15		3.0~10.0	11	6.5						
			10.5~20.0								
	20		3.0~10.0								
			10.5~20.0								
	30		3.0~10.0	14	9						
			10.5~20.0								

Machining Conditions: H+2≤T≤Px8

Ordering Example

• T Dimension Selectable

Part Number	-	T
WZAS15	-	10

• T Dimension Configurable

Part Number	-	H	-	T
TWZAB10	-	3.5	-	10.0

■Dimension Configurable

Part Number	D	0.5mm Increment V	P	H	T	Unit Price: Standard Grade FWZASS	FWZAC	FWZAB	FWZAM	FWZAA	FWZAAB / FWZAS	FWZACH	FWZABH	FWZAMH	FWZASK	FWZASKB	FWZASKM	FWZASH	Precision Grade FWZSC	FWZSB	FWZSM	FWZSS
Standard Grade FWZASS FWZAC FWZAB FWZAM FWZAA FWZAAB FWZAS FWZACH FWZABH FWZAMH FWZASK FWZASKB FWZASKM FWZASH	10.0~20.0 (0.5mm Increment)	5.0~90.0	3.0~88.0	1.0~48.0	3.0~10.0																	
					10.5~20.0																	
					20.5~30.0																	
					30.5~40.0																	
					40.5~50.0																	
	21~30 (1mm Increment)				3.0~10.0																	
					10.5~20.0																	
					20.5~30.0																	
					30.5~40.0																	
					40.5~50.0																	
	31~40 (1mm Increment)				3.0~10.0																	
					10.5~20.0																	
					20.5~30.0																	
					30.5~40.0																	
					40.5~50.0																	
	41~50 (1mm Increment)				3.0~10.0																	
					10.5~20.0																	
					20.5~30.0																	
					30.5~40.0																	
					40.5~50.0																	
	51~60 (1mm Increment)				3.0~10.0																	
					10.5~20.0																	
					20.5~30.0																	
					30.5~40.0																	
					40.5~50.0																	
Precision Grade FWZSC FWZSB FWZSM FWZSS	61~80 (1mm Increment)				5.0~10.0														-			
					10.5~20.0																	
					20.5~30.0																	
					30.5~40.0																	
					40.5~50.0																	
	81~100 (1mm Increment)				5.0~10.0																	
					10.5~20.0																	
					20.5~30.0																	
					30.5~40.0																	
					40.5~50.0																	

Machining Conditions

D	V	P
For 10 ~ 60	V ≤ D - 2	P ≤ V - 2
For 61 ~ 100	V ≤ D - 4	P ≤ V - 4

2≤(T-H)≤Px8 The shaft diameter is 2mm or more and Px8 or less.

Machining Conditions of Meterial EN 1.2510 Equiv. (FWZASK, FWZASKB and FWZASKM)

D	V	P
For 10	V≤D-2	P ≤ V - 2
For 10.5 ~ 30	V≤D-4	
For 31 ~ 60	V≤D-6	
For 61 ~ 80	V≤D-8	P ≤ V - 4
For 81 ~ 100	V≤D-10	

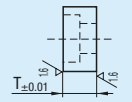
No specification available for sizes without declaration of value.

Ordering Example

Part Number	D	V	P	H	T
FWZASS	D25	V12.0	P6.0	H5.5	T10.5
FWZSC	D20	V10.0	P5.0	H5.5	T15.0

Alterations

Part Number	D	V	P	H	T	(TKC)
FWZASH	D15.0	V10.5	P6.5	H12.5	T18.5	TKC

Alteration	Code	Spec.
	TKC	Changes T dimension tolerance. Ordering Code TKC T±0.1⇒±0.01 ⊗FWZAA, FWZAS and FWZASH are not available for D=61 ~ 100. Applicable to Dimension Configurable Type, Standard Grade (except FWZAAB) only.

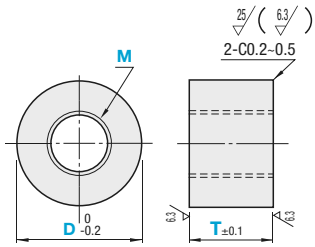
Metal Washer

Tapped



RoHS

T Dimension Selectable	T Dimension Configurable	Dimension Configurable	M Material	S Surface Treatment
Coarse Thread	Coarse Thread	Coarse Thread		
-	-	FWTAC	EN 1.1191 Equiv.	-
WTAB	TWTAB	FWTAB		Black Oxide
WTAM	TWTAM	FWTAM		Electroless Nickel Plating
-	-	FWTAA	Aluminum Alloy 2000 series	Clear Anodize
		FWTAAB		Black Anodize
WTAS	TWTAS	FWTAS	EN 1.4301 Equiv.	-



M	Pitch
	Coarse Thread
2	0.4
2.6	0.45
3	0.5
4	0.7
5	0.8
6	1.0
8	1.25
10	1.5
12	1.75
16	2.0
20	2.5
24	3.0
30	3.5

T Dimension Selectable

Part Number Type	D	M Selection	T Selection	Unit Price WTAB	WTAM	WTAS
WTAB WTAM WTAS	10	2 3 4 5	3 5 8 10			
	12	4 5 6	5 8 10 15			
	16	5 6 8	5 8 10 15			
	20	6 8 10	8 10 15 20			
	30	8 10 12	10 15 20			
	40	10 12 16	10 15 20			
	50	16 20	15 20			
	60	16 20	15 20			

T Dimension Configurable

Part Number Type	D	M Selection	T 0.5mm Increment
TWTAB TWTAM TWTAS	6	2 3 4	3.0~20.0
	8	2 3 4	
	10	2 3 4 5	
	12	4 5 6	3.5~20.0
	16	5 6 8	
	20	6 8 10	
	30	8 10 12	

T≤Mx8 M2 ⋯› T≤Mx5

Part Number Type	D	T 0.5mm Increment	Unit Price TWTAB	TWTAM	TWTAS
TWTAB TWTAM TWTAS	6~10	3.0~ 5.0			
		5.5~10.0			
		10.5~20.0			
	12, 16	3.5~ 5.0			
		5.5~10.0			
		10.5~20.0			
	20, 30	3.5~ 5.0			
		5.5~10.0			
		10.5~20.0			

Dimension Configurable

Part Number	D	M Selection	T 0.5mm Increment	Unit Price FWTAC	FWTAB	FWTAM	FWTAA	FWTAAB FWTAS
FWTAC FWTAB FWTAM FWTAA FWTAAB FWTAS	6~10 (0.5mm Increment)	2 (3≤T≤10)	3.0~ 5.0					
		2.6 (3≤T≤13)	5.5~10.0					
		3 (3≤T≤24)	10.5~20.0					
		4 (3≤T≤32)	20.5~30.0					
		5 (3≤T≤40)	30.5~40.0					
		6 (3≤T≤48)	40.5~50.0					
	10.5~20.0 (0.5mm Increment)	8 (4≤T≤50)	3.0~ 5.0					
		10 (5≤T≤50)	5.5~10.0					
		12 (6≤T≤50)	10.5~20.0					
		16 (6≤T≤50)	20.5~30.0					
		20 (8≤T≤50)	30.5~40.0					
		24 (10≤T≤50)	40.5~50.0					
		30 (12≤T≤50)	3.0~ 5.0					
	21~30 (1mm Increment)		5.5~10.0					
			10.5~20.0					
			20.5~30.0					
			30.5~40.0					
			40.5~50.0					
	31~40 (1mm Increment)		3.0~ 5.0					
			5.5~10.0					
			10.5~20.0					
			20.5~30.0					
			30.5~40.0					
			40.5~50.0					
	41~50 (1mm Increment)		3.0~ 5.0					
			5.5~10.0					
			10.5~20.0					
			20.5~30.0					
			30.5~40.0					
			40.5~50.0					
	51~60 (1mm Increment)		3.0~ 5.0					
			5.5~10.0					
			10.5~20.0					
			20.5~30.0					
			30.5~40.0					
			40.5~50.0					
	61~80 (1mm Increment)		5.0~10.0					
			10.5~20.0					
			20.5~30.0					
			30.5~40.0					
			40.5~50.0					
	81~100 (1mm Increment)		5.0~10.0					
			10.5~20.0					
			20.5~30.0					
			30.5~40.0					
			40.5~50.0					

(D-M) / 2≥2 T≤Mx8 M2, M2.6⋯› T≤Mx5

Ordering Example

Part Number	-	D	-	M	-	T
WTAB12			-	6	-	5
TWTAB12			-	6	-	5.5
FWTAM	-	D20	-	M5	-	T4.5

Alterations

Part Number	-	D	-	M	-	T	-	(WSC)
FWTAS	-	D15	-	M6	-	T15	-	WSC10

Alteration	Code	Spec.
	WSC	Adds two flats. Ordering Code WSC10 WSC=1mm Increment WSC≥M+4 ⊗Not available for D6 ~ D8. ⊗Not available for T Dimension Selectable/Configurable Type.

Metal Washer

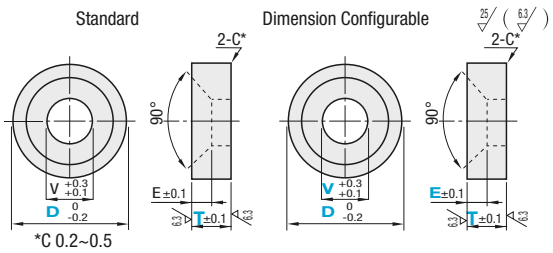
Countersunk / With Screw Holes

■Countersunk



RoHS

Standard	Dimension Configurable	Material	Surface Treatment
-	FWSRC	EN 1.1191 Equiv.	-
WSRB	FWSRB		Black Oxide
WSRM	FWSRM		Electroless Nickel Plating
-	FWSRA	EN AW-2017 Equiv.	Clear Anodize
WSRS	FWSRS	EN 1.4301 Equiv.	-



■Countersunk, Standard

Part Number Type	D	T Selection	E	V	Unit Price WSRB	WSRM	WSRS
WSRB WSRM WSRS	14	2.5	2.5	4.5			
		4					
		5					
	16	3	3	5.5			
		4					
		5					
	20	3.5	3.5	6.6			
		4					
		5					
	25	5	5	9			
		6					
	30	6	6	11			
		8					

■Countersunk, Dimension Configurable

Part Number	D	V 0.5mm Increment (V3 or More)	E 0.5mm Increment	T 0.5mm Increment	Unit Price FWSRC	FWSRB	FWSRM	FWSRA	FWSRS
FWSRC FWSRB FWSRM FWSRA FWSRS	10.0~20.0 (0.5mm Increment)	2.0	2.0~10.0 E≤T	2.0~ 5.0					
				5.5~10.0					
	21~30 (1mm Increment)			2.0~ 5.0					
				5.5~10.0					
	31~40 (1mm Increment)	2.6		2.0~ 5.0					
				5.5~10.0					
	41~50 (1mm Increment)	3~30		2.0~ 5.0					
				5.5~10.0					
	51~60 (1mm Increment)			2.0~ 5.0					
				5.5~10.0					

(D-V)/2-E≥1⋯1mm or more is required for the min. thickness.

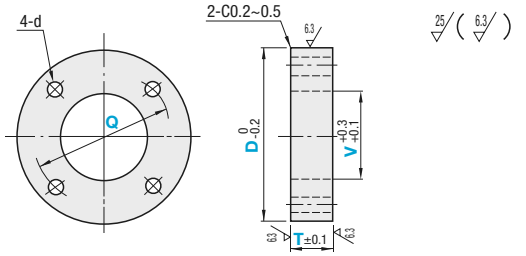
Circularity cannot be guaranteed because the thickness V becomes 0 when E=T.

■With Screw Holes



RoHS

Type	Material	Surface Treatment
WBAC	EN 1.1191 Equiv.	-
WBAB		Black Oxide
WBAM		Electroless Nickel Plating
WBAA	EN AW-2017 Equiv.	Clear Anodize
WBAS	EN 1.4301 Equiv.	-



Part Number Type	D	V 0.5mm Increment	Q 0.5mm Increment	T 1mm Increment	d	Applicable Screw	Unit Price WBAC T1~2	WBAC T3~5	WBAC T6~10	WBAB T1~2	WBAB T3~5	WBAB T6~10	WBAM T1~2	WBAM T3~5	WBAM T6~10	WBAA T2	WBAA T3~5	WBAA T6~10	WBAS T1~2	WBAS T3~5	WBAS T6~10
WBAC WBAB WBAM WBAA WBAS	20	3.0~ 5.0	10.5~13.5	1~10	3.5	M3															
	25	3.0~ 9.5	10.5~17		3.5	M3															
	30	3.0~10.0	12 ~20		4.5	M4															
	35	3.0~16.0	12 ~25		4.5	M4															
	40	3.0~20.0	12 ~30		4.5	M4															
	50	3.0~22.0	14 ~35		5.5	M5															
	60	3.0~28.0	14 ~40		5.5	M5															

Q≥V+d+4 T≥2 for WBAA.

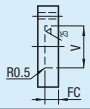
Ordering Example

Part Number	D	V	E	Q	T
WSRM14					2.5
FWSRS	D17.5	V6.5	E3		T7.5
WBAB30		V8		Q18	T3

Alterations

Part Number	D	V	E	Q	T	(TKC, FC)
FWSRB	D15	V5	E3		T3.0	TKC
WBAS40		V10		Q25	T10	FC3

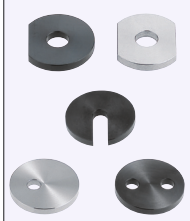
Alterations are available for Dimension Configurable Type only.

Alterations	Code	Spec.
T Dimension Tolerance 	TKC	Changes T dimension tolerance. Ordering Code TKC T±0.1⇒±0.01 Applicable to Countersunk Type only.
Blind Hole 	FC	Changes V hole to blind hole. Ordering Code FC3 FC=1mm Increment Applicable to Screw Holes Type only. T-FC≥2 V≥10 FC≥2

Metal Washers / Slotted Hole Washers

Shape Selectable　Flat / Pilot

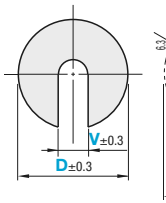
■Metal Washers



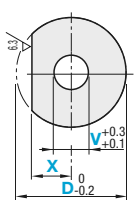
Part Number	M Material	S Surface Treatment
KWSC	EN 1.1191 Equiv.	-
KWSB		Black Oxide
KWSM		Electroless Nickel Plating
KWSS	EN 1.4301 Equiv.	-

25/ (6.3/)

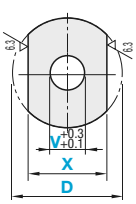
A (D-V) / 2≥3



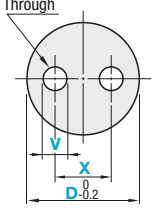
B X≥V / 2+2, X≤D / 2-1



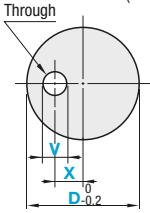
C X≥V+4, X≤D-2

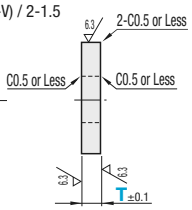


D X≥V+2, V≤D / 2-4, X≤D-V-3



E V≤D / 2-4, X≤(D-V) / 2-1.5





Part Number	Shape Selection	D	V 0.5mm Increment	X 0.1mm Increment	T 0.1mm Increment	Unit Price KWSC A	KWSC B	KWSC C	KWSC D	KWSC E	KWSB A	KWSB B	KWSB C	KWSB D	KWSB E	KWSM A	KWSM B	KWSM C	KWSM D	KWSM E	KWSS A	KWSS B	KWSS C	KWSS D	KWSS E
KWSC KWSB KWSM KWSS	A B C D E	10.0~20.5 0.5mm Increment	3~30	4.0~48.0	3.0~5.0																				
					5.1~10.0																				
		21~30 1mm Increment			3.0~5.0																				
					5.1~10.0																				
		31~40 1mm Increment			3.0~5.0																				
					5.1~10.0																				
		41~50 1mm Increment			3.0~5.0																				
					5.1~10.0																				

Ordering Example

Part Number	Shape	D	V	X	T
KWSB	B	D12.0	V5	X5.0	T3.0

Alterations

Part Number	Shape	D	V	T	(HH)
KWSB	A	D20	V10	T3	HH

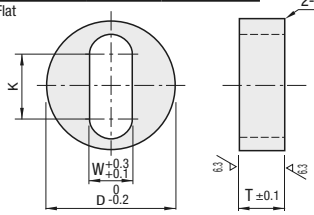
Alteration	Code	Spec.
	HH	Hardens the washer in the shape of A. H Hardness: 45 ~ 50HRC Ordering Code HH Applicable to KWSB and KWSC only. Deformation may occur in some cases due to heat treatment.

■Slotted Hole Washers



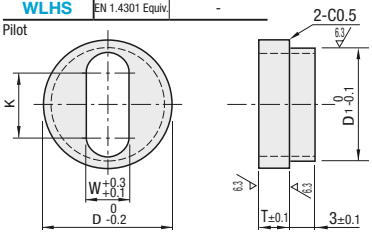
Type	M Material	S Surface Treatment
WLM	EN 1.1191 Equiv.	Electroless Nickel Plating
WLS	EN 1.4301 Equiv.	-

Flat



Type	M Material	S Surface Treatment
WLHM	EN 1.1191 Equiv.	Electroless Nickel Plating
WLHS	EN 1.4301 Equiv.	-

Pilot



25/ (6.3/)

■Flat

Part Number Type	No.	D	T	K	W	Applicable Screw	Unit Price WLM	Unit Price WLS
WLM WLS	3	18	3	5	3.5	M3		
	4	20		6	4.5	M4		
	5	22		7	5.5	M5		
	6	26		8	6.6	M6		
	8	30		10	9	M8		
	10	38	4	12	11	M10		
	12	46	5	16	14	M12		

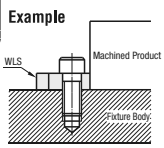
■Pilot

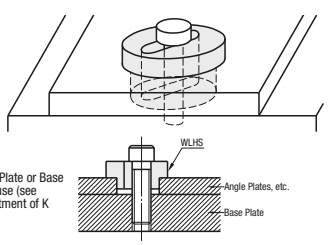
Part Number Type	No.	D	D1	T	K	W	Applicable Screw	Unit Price WLHM	Unit Price WLHS
WLHM WLHS	4	20	14	3	6	4.5	M4		
	5	22	16		7	5.5	M5		
	6	26	18		8	6.6	M6		
	8	30	22		10	9	M8		
	10	38	28	4	12	11	M10		
	12	46	36	5	16	14	M12		

Ordering Example

Part Number
WLM5
WLHS4

Example





For Pilot Type (WLHM, WLHS), drill a hole on Angle Plate or Base Plate, etc. to insert the pilot part (with D1) prior to use (see the right figure). The slotted hole allows fine-adjustment of K dimension.

Thin-Walled Metal Collars / Hollow Collars / Spacers

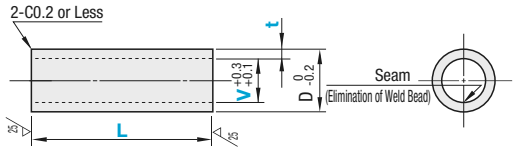
Thin-Walled Metal Collars



RoHS

Type	Material
TASC	EN 1.4301 Equiv.

L Dimension	Tolerance
3.0~10.0	±0.05
10.5~20.0	±0.1



Part Number Type	V	t	L 0.5mm Increment	D t0.5	D t1	Unit Price L3.0~5.0	L5.5~10.0	L10.5~15.0	L15.5~20.0
TASC	1	0.5 1	3.0 ~ 20.0	2	3				
	1.5			2.5	3.5				
	2			3	4				
	2.5			3.5	4.5				
	3			4	5				
	3.5			4.5	5.5				
	4			5	6				
	5			6	7				

Ordering Example: Part Number - t - L
TASC1 - 0.5 - 3.0

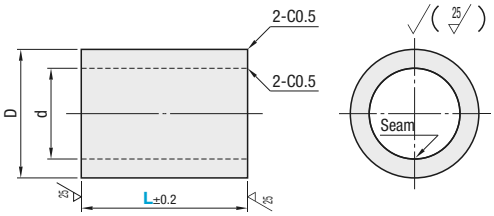
Hollow Collars



RoHS

Type	Material	Surface Treatment
SGP	EN 1.0035 Equiv.	-
SGPBB		Black Oxide
STPG	EN 1.0254 Equiv. (Sch40)	-
STPGB		Black Oxide
STPGH	EN 1.0254 Equiv. (Sch80)	-
STPGHB		Black Oxide

This tube has a welding seam on the I.D. surface.
Only EN 1.0035 Equiv. and SGPBB have 0.5 ~ 1mm weld seam rise inside.



Part Number Type	No.	L 0.5mm Increment	D	d EN 1.0035 Equiv. SGPBB	d JIS-STPG STPGB	d STPGH STPGHB	Unit Price SGP L6~80	SGP L80.5~150	SGP L150.5~200	SGPBB L6~80	SGPBB L80.5~150	SGPBB L150.5~200	STPG L6~80	STPG L80.5~150	STPG L150.5~200	STPGB L6~80	STPGB L80.5~150	STPGB L150.5~200	STPGH L6~80	STPGH L80.5~150	STPGH L150.5~200	STPGHB L6~80	STPGHB L80.5~150	STPGHB L150.5~200
SGP	6A	6.0~80.0	10.5	6.5	7.1	5.7		-	-															
SGPBB	8A		13.8	9.2	9.4	7.8		-	-		-	-		-	-		-	-		-	-		-	-
STPG	10A	10.0~150.0	17.3	12.7	12.7	10.9			-			-			-			-			-			-
STPGB	15A		21.7	16.1	16.1	14.3			-			-			-			-			-			-
STPGH	20A		27.2	21.6	21.4	19.4			-			-			-			-			-			-
STPGHB	25A	20.0~200.0	34.0	27.6	27.2	25.0																		
	32A		42.7	35.7	35.5	32.9																		
	40A		48.6	41.6	41.2	38.4																		

Ordering Example: Part Number - L
SGP6A - 45.0

Alterations: Part Number - L - (LKC)
STPG15A - 80 - LKC

Alteration	Code	Spec.
L Dimension Tolerance 	LKC	Changes L dimension tolerance from ±0.2 to ±0.05. Ordering Code LKC

Spacers

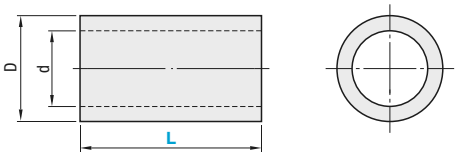


RoHS

Type	Material	Surface Treatment
SMKB	EN 1.0330 Equiv.	Trivalent Chromate (Black)

L Dimension	Tolerance
3, 4, 5, 8, 10	±0.05
12, 15, 20	±0.1
30	±0.15

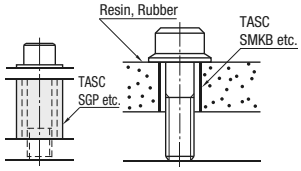
The circularity may be slightly deformed due to manufacturing process.



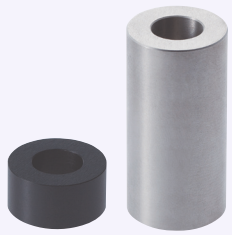
Part Number Type	No.	L Selection	D	d	Unit Price L3~10	L12~20	L30
SMKB	2	3 4 5 8 10	3	2		-	-
	2.6	3 4 5 8 10	3.65	2.65		-	-
	3	3 4 5 8 10 12 15 20	4	3			-
	4	3 4 5 8 10 12 15 20 30	5.3	4.1			
	5	3 4 5 8 10 12 15 20 30	6.3	5.1			
	6	3 4 5 8 10 12 15 20 30	7.8	6.2			
	8	4 5 8 10 12 15 20 30	10	8.2			
	10	5 8 10 12 15 20 30	12.2	10.2			

Ordering Example: Part Number - L
SMKB2.6 - 10

Example



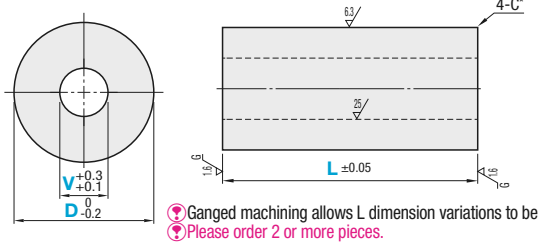
Simultaneous Grinding Spacers



RoHS

Type	Material	Surface Treatment	Hardness
DWSSB	EN 1.1191 Equiv.	Black Oxide	-
DWSSM		Electroless Nickel Plating	
DWSSS	EN 1.4301 Equiv.	-	
DWSSKB	EN 1.2510 Equiv.	Black Oxide	55HRC~
DWSSKM		Electroless Nickel Plating	

* D=16 or Less: C0.1 ~ 0.2
D=20 or More: C0.5 or Less



Ganged machining allows L dimension variations to be within ±5 micro meters per order.
Please order 2 or more pieces.

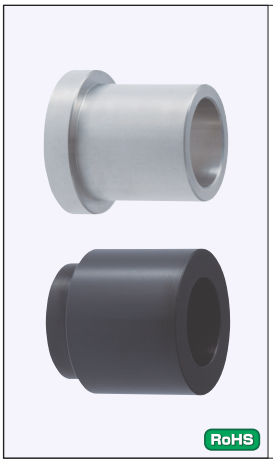
Part Number	D 0.5mm Increment	V 0.5mm Increment (V3 or More)	L Machining Conditions	L 0.1mm Increment	Simultaneous Grinding Maximum Quantity	Unit Price DWSSB	DWSSM	DWSSS	DWSSKB	DWSSKM
DWSSB DWSSM DWSSS DWSSKB DWSSKM	4.0~10.0	0 2 2.6 3.0~8.0	L≤40 ⇒D-V≥2 40.1≤L≤50 ⇒D-V≥4	1.0~ 5.0	100 pcs.					
				5.1~ 10.0						
				10.1~ 25.0						
				25.1~ 40.0						
				40.1~ 50.0						
	10.5~15.5	0 2 2.6 3.0~13.5	L≤40 ⇒D-V≥2 40.1≤L≤80 ⇒D-V≥4 80.1≤L≤100 ⇒D-V≥6	1.0~ 5.0						
				5.1~ 10.0						
				10.1~ 25.0						
				25.1~ 40.0						
				40.1~ 55.0						
				55.1~ 70.0						
				70.1~ 85.0						
				85.1~ 100.0						
	16.0~20.0	0 2 2.6 3.0~18.0	L≤40 ⇒D-V≥2 40.1≤L≤80 ⇒D-V≥4 80.1≤L≤100 ⇒D-V≥6	1.0~ 20.0	50 pcs.					
				20.1~ 30.0						
				30.1~ 40.0						
				40.1~ 50.0						
				50.1~ 60.0						
				60.1~ 70.0						
				70.1~ 80.0						
				80.1~ 90.0						
				90.1~ 100.0						
	20.5~30.0	0 2 2.6 3.0~28.0	L≤50 ⇒D-V≥2 50.1≤L≤100 ⇒D-V≥6	1.0~ 20.0						
				20.1~ 30.0						
				30.1~ 40.0						
				40.1~ 50.0						
				50.1~ 60.0						
				60.1~ 70.0						
				70.1~ 80.0						
				80.1~ 90.0						
				90.1~ 100.0						
	30.5~39.5	0 2 2.6 3.0~37.5	L≤50 ⇒D-V≥2 50.1≤L≤100 ⇒D-V≥6	1.0~ 20.0	20 pcs.				-	-
				20.1~ 30.0						
				30.1~ 40.0						
				40.1~ 50.0						
				50.1~ 60.0						
				60.1~ 70.0						
				70.1~ 80.0						
				80.1~ 90.0						
				90.1~ 100.0						
	40.0~50.0	0 2 2.6 3.0~48.0	L≤50 ⇒D-V≥2 50.1≤L≤100 ⇒D-V≥6	1.0~ 20.0						
				20.1~ 30.0						
				30.1~ 40.0						
				40.1~ 50.0						
				50.1~ 60.0						
				60.1~ 70.0						
				70.1~ 80.0						
				80.1~ 90.0						
				90.1~100.0						

Common Machining Conditions: ①L≤Vx8 ②DWSSS(EN 1.4301 Equiv.)⇒L≥2 Please order 2 or more pieces. No specification available for sizes without declaration of value.

Ordering Example

Part Number	-	D	-	V	-	L
DWSSS	-	D35.5	-	V12.5	-	L58.4

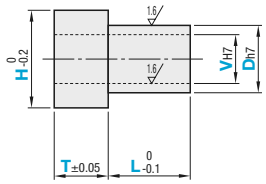
Stepped Spacers



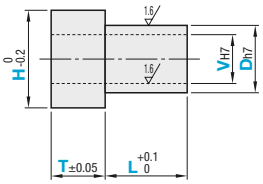
RoHS

Type	T L Tolerance	M Material	S Surface Treatment
DCLB	0 -0.1	EN 1.1191 Equiv.	Black Oxide
DCLM			Electroless Nickel Plating
DCLS		EN 1.4301 Equiv.	-
MCLB	+0.1 0	EN 1.1191 Equiv.	Black Oxide
MCLM			Electroless Nickel Plating
MCLS		EN 1.4301 Equiv.	-

■L Tolerance 0 -0.1



■L Tolerance +0.1 0



6.3 (1.6)

Circumference C0.5 or Less

Part Number	Dh7 0.5mm Increment	VH7 0.5mm Increment	H 0.5mm Increment	T 0.1mm Increment	L 0.1mm Increment	Unit Price L Tolerance -0.1~0 DCLB	DCLM	DCLS	Unit Price L Tolerance 0~+0.1 MCLB	MCLM	MCLS
L Tolerance 0~-0.1 DCLB DCLM DCLS / L Tolerance +0.1~0 MCLB MCLM MCLS	5.0~10.0	2.0~8.0 (V≤D-2)	7.0~16.0 (D+2≤H≤D+6)	1.0~20.0	1.0~ 5.0						
					5.1~10.0						
					10.1~25.0						
					25.1~40.0						
					40.1~50.0						
	10.5~20.0	2.0~18.0 (V≤D-2)	12.5~26.0 (D+2≤H≤D+6)		1.0~ 5.0						
					5.1~10.0						
					10.1~25.0						
					25.1~40.0						
					40.1~50.0						
	20.5~30.0	2.0~28.0 (V≤D-2)	22.5~40.0 (D+2≤H≤D+10)		1.0~20.0						
					20.1~30.0						
					30.1~40.0						
					40.1~50.0						
	30.5~40.0	6.0~36.0 (V≤D-4)	32.5~50.0 (D+2≤H≤D+10)		1.0~20.0						
					20.1~30.0						
					30.1~40.0						
					40.1~50.0						
	40.5~50.0	10.0~44.0 (V≤D-6)	42.5~60.0 (D+2≤H≤D+10)		1.0~20.0						
					20.1~30.0						
					30.1~40.0						
					40.1~50.0						

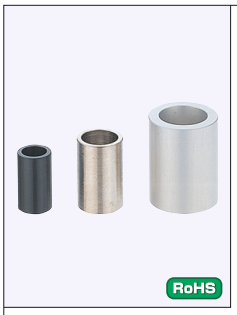
Common Machining Conditions: ①L+T≤Vx8 ②When V≥8 and L+T≥Vx4, intermediate clearance is added.

Ordering Example

Part Number	-	D	-	V	-	H	-	T	-	L
DCLS	-	D25.5	-	V12.5	-	H33.5	-	T10.7	-	L40.2

Metal Collar

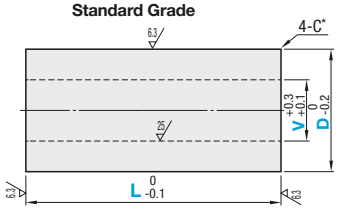
Standard Grade, L Dimension Selectable



Type Standard Grade	Material	Surface Treatment
KNCLB	EN 1.1191 Equiv.	Black Oxide
KNCLM		Electroless Nickel Plating
KNCLSS	EN 1.4301 Equiv.	-

* D=16 or Less: C0.1 ~ 0.2
D=20 or More: C0.5 or Less

Standard Grade



■Standard Grade

Part Number		D Selection												L Selection
Type	V													
KNCLB KNCLM KNCLSS	3	5	6	8	10	12								10 12 15 20 25 30 35
	4		6	8	10	12	13	14	15	16	20			
	5			8	10	12	13	14	15	16	20			
	6			8	10	12	13	14	15	16	20	25		
	8				10	12	13	14	15	16	20	25	30	
	10					12	13	14	15	16	20	25	30	
	12								15	16	20	25	30	
	15										20	25	30	
	16										20	25	30	
	20											25	30	
	25												30	

Ordering Example

Part Number	-	D	-	L
KNCLB3	-	5	-	10

Part Number		Unit Price						
Type	D	L10	L12	L15	L20	L25	L30	L35
KNCLB	5							
	6							
	8							
	10							
	12							
	13							
	14							
	15							
	16							
	20							
	25							
	30							

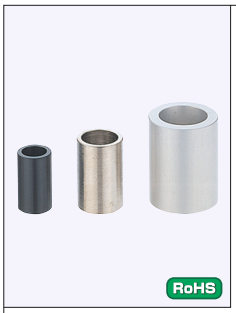
Part Number		Unit Price						
Type	D	L10	L12	L15	L20	L25	L30	L35
KNCLM	5							
	6							
	8							
	10							
	12							
	13							
	14							
	15							
	16							
	20							
	25							
	30							

Part Number		Unit Price						
Type	D	L10	L12	L15	L20	L25	L30	L35
KNCLSS	5							
	6							
	8							
	10							
	12							
	13							
	14							
	15							
	16							
	20							
	25							
	30							

The prices are based on the O.D. (D).

Metal Collar

Standard Grade / Precision Grade, L Dimension Configurable



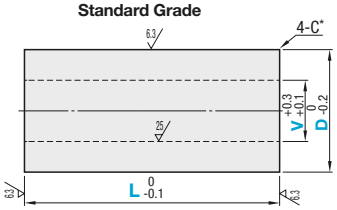
RoHS

Type		M Material	S Surface Treatment
L Dimension Configurable			
Standard Grade	Precision Grade		
NCLC	ACSC	EN 1.1191 Equiv.	-
NCLB	ABSC		Black Oxide
NCLM	AMSC		Electroless Nickel Plating
NCLA	AASC	Aluminum Alloy 2000 series	Clear Anodize
NCLSS	SASC	EN 1.4301 Equiv.	-

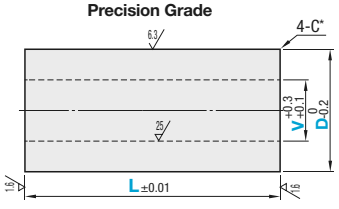
Hardened Type P.137

* D=16 or Less: C0.1 ~ 0.2
D=20 or More: C0.5 or Less

Standard Grade



Precision Grade



Standard Grade / Precision Grade

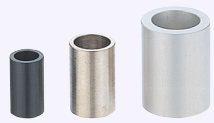
Part Number		D Selection	L 0.1mm Increment	Unit Price									
				Standard Grade					Precision Grade				
Type	V			NCLC	NCLB	NCLM	NCLA	NCLSS	ACSC	ABSC	AMSC	AASC	SASC
Standard Grade NCLC NCLB NCLM NCLA NCLSS / Precision Grade ACSC ABSC AMSC AASC SASC	2	4 5 6 8 10	10.0~ 16.0										
	3	5 6 8 10 12	10.0~ 25.0										
			25.1~ 50.0										
	4 5 6	(6) 8 10 12 13 14 15 16 (6)···Applicable to V4.	10.0~ 25.0										
			25.1~ 50.0										
		20 25	10.0~ 25.0										
			25.1~ 50.0										
	8 10 12	(10) (12) (13) (14) 15 16 (10)···Applicable to V8. (12 13 14)···Applicable to V8, 10.	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
		20 25	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
		30 35	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
	10 12	40 50 60	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
	15 16 20	(20) 25 (20)···Applicable to V15, 16.	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
		30 35	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
		40 50 60	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
	25	30 35	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										
	25 30	40 50 60	10.0~ 25.0										
			25.1~ 50.0										
			50.1~ 75.0										
			75.1~ 100.0										

Ordering Example

Part Number	-	D	-	L
NCLB3	-	5	-	10.5

Metal Collar

Standard Grade / Precision Grade, Dimension Configurable



RoHS

Part Number		Material	Surface Treatment
Standard Grade	Precision Grade		
FNCL	FAC	EN 1.0038 Equiv.	-
FNCLC	FACS	EN 1.1191 Equiv.	-
FNCLB	FABSC		Black Oxide
FNCLM	FAMSC		Electroless Nickel Plating
FNCLR	FARSC		LTBC Plating
FNCLBB	-	Brass (JIS EN CW614N Equiv.)	-
FNCLA	FAASC	Aluminum Alloy 2000 series	Clear Anodize
FNCLAB	-		Black Anodize
FNCLSS	FSASC	EN 1.4301 Equiv.	-
FNCLSSR	FSASCR		LTBC Plating

Hardened Type P.137

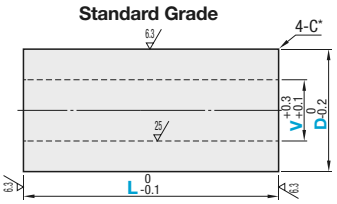
* D=16 or Less: C0.1 ~ 0.2
D=16.5 or More: C0.5 or Less

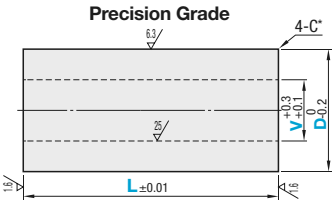
Machining Conditions
*1 Machining Limits of Collar Thickness and Overall Length
10.0≤L≤50.0⋯› (D-V)/2≥1
50.1≤L≤100.0⋯› (D-V)/2≥2

*2 Machining Limits of Collar Thickness and Overall Length (Material: EN AW-2017 Equiv., Brass)
4≤D≤10 ⋯› V≤D-2
10.5≤D≤30 ⋯› V≤D-4
31≤D≤60 ⋯› V≤D-6
61≤D≤80 ⋯› V≤D-8
81≤D≤100⋯› V≤D-10

*3 Machining Limits of V and Overall Length
L≤Vx8

Standard Grade





Part Number	V 0.5mm Increment (V3 or More)	D	L 0.1mm Increment	Unit Price FNCL	FNCLC	FNCLB	FNCLM	FNCLR	FNCLBB	FNCLA FNCLAB	FNCLSS	FNCLSSR
FNCL FNCLC FNCLB FNCLM FNCLR FNCLBB FNCLA FNCLAB FNCLSS FNCLSSR	(Selection) 2.0 2.6 (0.5mm Increment) 3.0~90.0	4.0~10.0 (0.5mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0						-	-		
		10.5~20.0 (0.5mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0									
		21~30 (1mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0									
		31~40 (1mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0									
		41~50 (1mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0									
		51~60 (1mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0									
		61~75 (1mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0									
		76~80 (1mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0							-		
		81~100 (1mm Increment)	10.0~ 25.0									
			25.1~ 50.0									
			50.1~ 75.0									
			75.1~ 100.0							-		

Machining Conditions *1, *2, *3 Foreign Exchange and Foreign Trade Act restricts the export of collars whose O.D. is more than 75mm and over length exceed O.D. Size D>75/L75 is discontinued.

Ordering Example: Part Number - V - D - L
FNCLB - V10.5 - D19.5 - L50.5

■Precision Grade

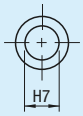
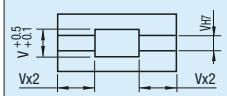
Part Number	V 0.5mm Increment (V3 or More)	D	L 0.1mm Increment	Unit Price FAC	FACS	FABSC	FAMSC	FARSC	FAASC	FSASC	FSASCR
FAC FACS FABSC FAMSC FARSC FAASC FSASC FSASCR	(Selection) 2.0 2.6 (0.5mm Increment) 3.0~90.0	4.0~10.0 (0.5mm Increment)	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
		10.5~20.0 (0.5mm Increment)	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
		21~30 (1mm Increment)	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
		31~40 (1mm Increment)	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
		41~50 (1mm Increment)	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
		51~60 (1mm Increment)	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
		61~80 (1mm Increment)	10.0~ 25.0						-	-	-
			25.1~ 50.0						-	-	-
			50.1~ 75.0						-	-	-
			75.1~ 100.0						-	-	-
		81~100 (1mm Increment)	10.0~ 25.0						-	-	-
			25.1~ 50.0						-	-	-
			50.1~ 75.0						-	-	-
			75.1~ 100.0						-	-	-

Machining Conditions *1, *2, *3 No specification available for sizes without declaration of value.

Ordering Example: Part Number - V - D - L → FAMSC - V10.5 - D19.5 - L50.5

Alterations: Part Number - V - D - L - (VKC, DKC, HKC) → FNCLB - V10.5 - D45 - L70.5 - VKC

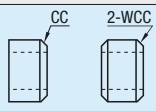
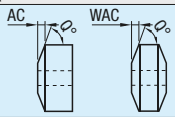
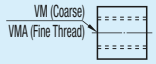
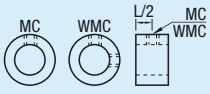
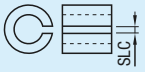
When both I.D./O.D. tolerance changes are specified, the concentricity is Ø0.02.

Alteration	Code	Spec.
I.D. Tolerance 	VKC	Changes the I.D. Tolerance to H7. Not applicable for FNCLAB. Ordering Code VKC Machining Conditions When V≥8 and L≥Vx5, adds a central relief shown on the right.  D≥6 V≥3

D	D-V
6~10	D-V≥ 2
10.5~20	D-V≥ 3
21~30	D-V≥ 6
31~40	D-V≥ 8
41~50	D-V≥10
51~60	D-V≥12
61~70	D-V≥14
71~80	D-V≥16
81~90	D-V≥18
91~100	D-V≥20

Alteration	Code	Spec.
O.D. Tolerance 	DKC (g6) HKC (h7)	Changes the O.D. Tolerance to g6 or h7. Ordering Code DKC, HKC Machining Conditions D≥6 Not applicable for FNCLAB

D	D-V
6~10	D-V≥ 2
10.5~20	D-V≥ 3
21~30	D-V≥ 6
31~40	D-V≥ 8
41~50	D-V≥10
51~60	D-V≥12
61~70	D-V≥14
71~80	D-V≥16
81~90	D-V≥18
91~100	D-V≥20

Alterations	C Chamfering (One Side - Both Sides)	Taper (One Side – Both Sides)	Tapping	Set Screw Hole (1-set 2-set)	Slitting
					Combination with other alterations is not available. 
Code	CC, WCC	AC, WAC	VM (Coarse Thread) VMA (Fine Thread)	MC, WMC	SLC
Spec.	Chamfers C plane. Ordering Code CC1.5 WCC2.5 CC, WCC=0.5mm Increment CC, WCC≤10 CC, WCC<(D-V) / 2 L-CC≥5 L-(WCCx2)≥5	Adds a taper. Ordering Code AC3.5-Q60 WAC5.0-Q30 AC, WAC=0.5mm Increment Q=Selection from 15, 20, 30 and 60 AC≤L-5 (D-V) / 2≥tanQxAC(WAC)+0.5	Adds a tapped hole (through). Ordering Code VM4: V should be specified as VM or VMA. Ex.) FNCL-VMA4-D10-L18 For the machining limits of tap dia. and overall length (L), see the table below. Tap dia.≤D / 2	Adds a tapped hole (coarse thread) at D part. Ordering Code MC3 WMC5 For the condition of thickness (D-V) / 2, see table below. L≥MC,WMCx3 MC, WMC=Select from table below.	Adds a slit. Ordering Code SLC For the condition of thickness (D-V) / 2, see table below. Slit width is fixed.

Tapped Hole Dia. VM, VMA	VM Pitch (Coarse)	VMA Pitch (Fine)	L max
4	0.7	0.5	20
5	0.8		30
6	1.0	0.75	35
8	1.25		40
10	1.5	1.0	50
12	1.75		55
16	2.0		90
18	-	1.5	100
20	2.5		

MC, WMC	(D-V)/2
3, 4	3 or More
5, 6, 8	5 or More
10, 12	8 or More

O.D. D	SLC	(D-V)/2
10.0~20.0	1	5 or Less
20.5~40	2	10 or Less
41~	3	20 or Less

D, V and L dimension tolerances are the values before alteration. They may change after alteration depending on materials.

Metal Collar

Standard Grade / Precision Grade I.D. / O.D. Tolerance Selectable / Dimension Configurable



Part Number		Material	Surface Treatment
Standard Grade	Precision Grade		
SNCC	SNMC	EN 1.1191 Equiv.	-
SNCB	SNMB		Black Oxide
SNCM	SNMM		Electroless Nickel Plating
SNCS	SNMS	EN 1.4301 Equiv.	-

D	D Tolerance Selection			
	G	H	N	X
	g6	h7	-	-
5.0~8.5	-	-	-0.1 -0.3	0 -0.2
9.0~10.0	-0.005 -0.014	0 -0.015		
10.5~18.0	-0.006 -0.017	0 -0.018		
18.5~30	-0.007 -0.020	0 -0.021		
31~50	-0.009 -0.025	0 -0.025		
51~60	-0.010 -0.029	0 -0.030		

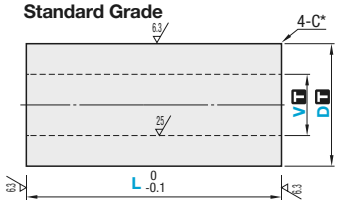
V	V Tolerance Selection		
	H	N	X
	H7	-	-
3.0	+0.010 0	+0.3 +0.1	+0.2 0
3.5~6.0	+0.012 0		
6.5~10.0	+0.015 0		
10.5~18.0	+0.018 0		
18.5~30.0	+0.021 0		
30.5~50.0	+0.025 0		
50.5~58.0	+0.030 0		

■I.D./O.D. Tolerance Price Number List

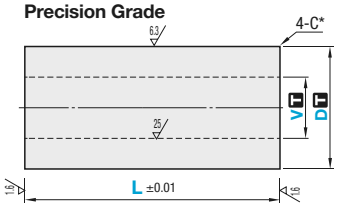
D (O.D.)	V (I.D.)	Price No.
G	H	②
	N	①
	X	①
H	H	②
	N	①
	X	①
N	H	①
	N	③
	X	③
X	H	①
	N	③
	X	③

・Guide to Price List
Ex.> When ordering Material EN 1.1191 Equiv., O.D. g6, I.D. H7 and L Tolerance ±0.01
Part Number: SNMC–GH–V4.0–D10.0–L10.0
1. Check the I.D./O.D. Tolerance Price Number List.
(GH is Price Number②)
2. In the price list of precision grade, find the column of I.D./O.D. tolerance price ② shown in the price list of precision grade.

Standard Grade



Precision Grade



* D=16 or Less: C0.1 ~ 0.2
D=16.5 or More: C0.5 or Less

■Standard Grade

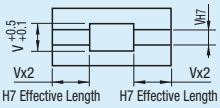
Part Number	D Tolerance Selection	V Tolerance Selection	V 0.5mm Increment	D	L 0.1mm Increment	Unit Price SNCC Tolerance ①	SNCC Tolerance ②	SNCC Tolerance ③	SNCB Tolerance ①	SNCB Tolerance ②	SNCB Tolerance ③	SNCM Tolerance ①	SNCM Tolerance ②	SNCM Tolerance ③	SNCS Tolerance ①	SNCS Tolerance ②	SNCS Tolerance ③
SNCC SNCB SNCM SNCS	G H N X	H N X	3.0~58.0 (V≤D-2) ㊟Refer to the following.	5.0~10.0 0.5mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 64.0												
				10.5~20.0 0.5mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				21~30 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				31~40 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				41~50 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				51~60 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												

㊟D≥9 is applicable when G or H is selected as the tolerance values of D and V. The dimension range of V is shown in the table below.

D	V
9~30	D-V≥6
31~60	D-V≥12

㊟Machining Limits of V and Overall Length
L≤Vx8

㊟When H is selected as the tolerance values of D and V, and L≥Vx4 when V≥8, a middle relief is added.



Ordering Example

Part Number - Tolerance Selection - V - D - L
(Tolerance Selection: D V)

SNCS - G H - V10.0 - D25 - L50.5

■Precision Grade

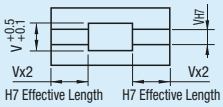
Part Number	D Tolerance Selection	V Tolerance Selection	V 0.5mm Increment	D	L 0.1mm Increment	Unit Price SNMC Tolerance ①	SNMC Tolerance ②	SNMC Tolerance ③	SNMB Tolerance ①	SNMB Tolerance ②	SNMB Tolerance ③	SNMM Tolerance ①	SNMM Tolerance ②	SNMM Tolerance ③	SNMS Tolerance ①	SNMS Tolerance ②	SNMS Tolerance ③
SNMC SNMB SNMM SNMS	G H N X	H N X	3.0~58.0 (V≤D-2) ※Refer to the following.	5.0~10.0 0.5mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 64.0												
				10.5~20.0 0.5mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				21~30 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				31~40 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				41~50 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												
				51~60 1mm Increment	10.0~ 25.0												
					25.1~ 50.0												
					50.1~ 75.0												
					75.1~100.0												

※D≥9 is applicable when G or H is selected as the tolerance values of D and V.
The dimension range of V is shown in the table below.

D	V
9~30	D-V≥6
31~60	D-V≥12

※Machining Limits of V and Overall Length
L≤Vx8

※When H is selected as the tolerance values of D and V, and L≥Vx4 when V≥8, a middle relief is added.



Ordering Example

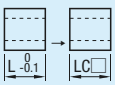
Part Number - Tolerance Selection - V - D - L
D V

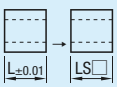
SNMS - G H - V10.0 - D25 - L50.5

Alterations

Part Number - Tolerance Selection - V - D - L - • Standard Grade (LCB, LCC, LCD, LCE) • Precision Grade (LSB, LSC, LSD, LSE)
D V

SNCS - G H - V10.0 - D25 - L50.0 - LCB

Alterations Code	Negative Tolerance LCB	Positive Tolerance LCC	Zero, Negative Tolerance LCD	Zero, Positive Tolerance LCE
Standard Grade L Tolerance Change  ※Applicable to Standard Grade	Changes L Tolerance (L) L -0.1 -0.2 Ordering Code LCB	Changes L Tolerance (L) L +0.3 +0.1 Ordering Code LCC	Changes L Tolerance (L) L 0 -0.2 Ordering Code LCD	Changes L Tolerance (L) L +0.2 0 Ordering Code LCE

Alterations Code	Negative Tolerance LSB	Positive Tolerance LSC	Zero, Negative Tolerance LSD	Zero, Positive Tolerance LSE
Precision Grade L Tolerance Change  ※Applicable to Precision Grade	Changes L Tolerance (L) L -0.01 -0.03 Ordering Code LSB	Changes L Tolerance (L) L +0.03 +0.01 Ordering Code LSC	Changes L Tolerance (L) L 0 -0.02 Ordering Code LSD	Changes L Tolerance (L) L +0.02 0 Ordering Code LSE

Metal Collar

Hardened Type - Standard Grade / Precision Grade, L Dimension Configurable / Dimension Configurable



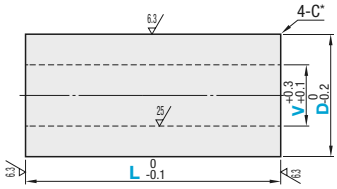
RoHS

Part Number				M Material	S Surface Treatment	H Hardness
L Dimension Configurable		Dimension Configurable				
Standard Grade	Precision Grade	Standard Grade	Precision Grade			
NCLCH	ASH	FNCLCH	FAS	EN 1.1191 Equiv.	-	45~50HRC
NCLBH	ASC	FNCLBH	FASC		Black Oxide	
NCLMH	PASC	FNCLMH	FPASC		Electroless Nickel Plating	
-	-	FNCSK	FASK	EN 1.2510 Equiv.	-	55HRC~
		FNCSKB	FASKB		Black Oxide	
		FNCSKM	FASKM		Electroless Nickel Plating	
NCLSSH	SASCH	FNCLSH	FSASCH	EN 1.4031 Equiv.	-	45~50HRC

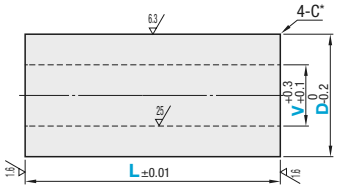
Depending on thickness and length, EN 1.1191 Equiv. Hardened Type may be less than 45HRC.
Stainless Steel Hardened Type may be discolored due to hardening.

* D=16 or Less: C0.1 ~ 0.2
D=16.5 or More: C0.5 or Less

Standard Grade



Precision Grade



■L Dimension Configurable, Standard Grade / Precision Grade

Part Number		D Selection	L 0.1mm Increment	Unit Price							
				Standard Grade				Precision Grade			
Type	V			NCLCH	NCLBH	NCLMH	NCLSSH	ASH	ASC	PASC	SASCH
Standard Grade NCLCH NCLBH NCLMH NCLSSH / Precision Grade ASH ASC PASC SASCH	2	4 5 6 8 10	10.0~ 16.0								
	3	5 6 8 10 12	10.0~ 25.0								
			25.1~ 50.0								
	4 5 6	(6) 8 10 12 13 14 15 16 (6)···Applicable to V4.	10.0~ 25.0								
			25.1~ 50.0								
		20 25	10.0~ 25.0								
			25.1~ 50.0								
	8 10 12	(10) (12) (13) (14) 15 16 (10)···Applicable to V8. (12 13 14)···Applicable to V8, 10.	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
	8 10 12 15 16 20	(20) 25 (20)···Not applicable to V20.	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
	8 10 12 15 16 20 25	30 35	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								
	10 12 15 16 20 25 30	40 50 60	10.0~ 25.0								
			25.1~ 50.0								
			50.1~ 75.0								
			75.1~ 100.0								

Ordering Example: Part Number - D - L
NCLCH10 - 20 - 50.5

■Dimension Configurable, Standard Grade / Precision Grade

Part Number	V 0.5mm Increment (V3 or More)	D	L 0.1mm Increment	Unit Price													
				Standard Grade							Precision Grade						
				FNCLCH	FNCLBH	FNCLMH	FNCSK	FNCSKB	FNCSKM	FNCLSH	FAS	FASC	FPASC	FASK	FASKB	FASKM	FSASCH
Standard Grade FNCLCH FNCLBH FNCLMH FNCSK FNCSKB FNCSKM FNCLSH Precision Grade FAS FASC FPASC FASK FASKB FASKM FSASCH	(Selection) 2.0 2.6 (0.5mm Increment) 3.0~90.0	4.0~10.0 (0.5mm Increment)	10.0~ 25.0															
			25.1~ 50.0															
			50.1~ 75.0								-	-	-	-	-	-	-
			75.1~ 100.0				-	-	-		-	-	-	-	-	-	-
		10.5~20.0 (0.5mm Increment)	10.0~ 25.0														
			25.1~ 50.0														
			50.1~ 75.0														
			75.1~ 100.0														
		21~30 (1mm Increment)	10.0~ 25.0														
			25.1~ 50.0														
			50.1~ 75.0														
			75.1~ 100.0														
		31~40 (1mm Increment)	10.0~ 25.0														
			25.1~ 50.0														
			50.1~ 75.0														
			75.1~ 100.0														
		41~50 (1mm Increment)	10.0~ 25.0														
			25.1~ 50.0														
			50.1~ 75.0														
			75.1~ 100.0														
		51~60 (1mm Increment)	10.0~ 25.0														
			25.1~ 50.0														
			50.1~ 75.0														
			75.1~ 100.0														
		61~80 (1mm Increment)	10.0~ 25.0														-
			25.1~ 50.0														-
			50.1~ 75.0														-
			75.1~ 100.0														-
		81~100 (1mm Increment)	10.0~ 25.0														-
			25.1~ 50.0														-
			50.1~ 75.0														-
			75.1~ 100.0														-

Machining Limits of Collar Thickness and Overall Length
10.0≤L≤50.0 ⋯› (D-V)/2≥1
50.1≤L≤100.0 ⋯› (D-V)/2≥3

Machining Limits of Collar Thickness and Overall Length (Material: EN 1.2510 Equiv.)
4≤D≤10 ⋯› V≤D-2
10.5≤D≤30 ⋯› V≤D-4
31≤D≤60 ⋯› V≤D-6
61≤D≤80 ⋯› V≤D-8
81≤D≤100 ⋯› V≤D-10

Machining Limits of V and Overall Length
L≤Vx8

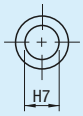
Ordering Example

Part Number	-	V	-	D	-	L
FNCLCH	-	V10.5	-	D19.5	-	L50.5

Alterations

Part Number	-	V	-	D	-	L	-	(VKC)
FNCLBH	-	V10.5	-	D30	-	L30.5	-	VKC

⊗Not applicable to L Dimension Configurable Type.

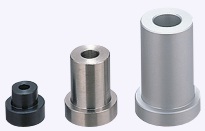
Alteration	Code	Spec.
I.D. Tolerance 	VKC	Changes the I.D. Tolerance to H7. Ordering Code VKC Machining Conditions 6≤D≤40 V≥3 L≤40 When V<5, L≤Vx4 When V≥5, L≤Vx3

Thickness Conditions

D	D-V
6~15	D-V≥3
15.5~18	D-V≥4
18.5~20	D-V≥5
21~40	D-V≥6

Metal Collar

Flanged, Standard Grade / Precision Grade

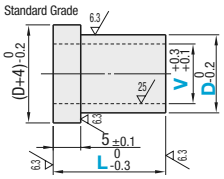


RoHS

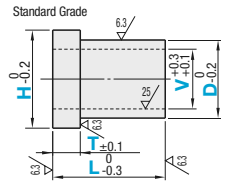
Type			M Material	S Surface Treatment	H Hardness
Standard	Configurable				
Standard Grade		Precision Grade			
-	FTCLS	-	EN 1.0038 Equiv.	-	-
-	FTCLC	FTCLMC	EN 1.1191 Equiv.	-	-
TCLB	FTCLB	FTCLMB		Black Oxide	
TCLM	FTCLM	FTCLMM		Electroless Nickel Plating	
-	FTCLBB	-	Brass (JIS EN CW614N Equiv.)	-	-
TCLA	FTCLA	-	Aluminum Alloy 2000 series	Clear Anodize	-
-	FTCLAB			Black Anodize	
TCLSS	FTCLSS	-	EN 1.4301 Equiv.	-	-
-	FTCLCH	-	EN 1.1191 Equiv.	-	45~50HRC
	FTCLBH			Black Oxide	
	FTCLMH			Electroless Nickel Plating	
-	FTCLSK	-	EN 1.2510 Equiv.	-	55HRC~
-	FTCLSH	FTCMSH	EN 1.4031 Equiv.	-	45~50HRC

Depending on thickness and length, EN 1.1191 Equiv. Hardened Type may be less than 45HRC.
Stainless Steel Hardened Type may be discolored due to hardening.

Standard

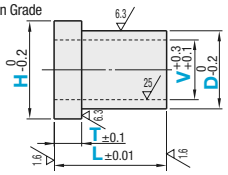


Dimension Configurable



Circumference C0.5 or Less

Precision Grade



Standard Type, Standard Grade

Part Number Type	V	D Selection	L 0.1mm Increment
TCLB TCLM TCLA TCLSS	2	5 6 8 10	10.0~16.0
	3	5 6 8 10 12	10.0~50.0
	4	6 8 10 12 13 14 15 16 20	
	5	8 10 12 13 14 15 16 20	
	6	8 10 12 13 14 15 16 20 25	
	8	10 12 13 14 15 16 20 25 30	10.0~100.0
	10	12 13 14 15 16 20 25 30 35 40 50	
	12	15 16 20 25 30 35 40 50	
	15	20 25 30 35 40 50 60	
	16	20 25 30 35 40 50 60	
	20	25 30 35 40 50 60	
	25	30 35 40 50 60	
	30	40 50 60	

Part Number Type	V	Unit Price L10.0~25.0	25.1~50.0	50.1~75.0	75.1~100.0
TCLB	2		-	-	-
	3 4 5			-	-
	6			-	-
	8 10				
	12				
	15				
	16				
	20				
	25				
	30				
TCLM	2		-	-	-
	3 4 5			-	-
	6			-	-
	8 10				
	12				
	15				
	16				
	20				
	25				
	30				

Part Number Type	V	Unit Price L10.0~25.0	25.1~50.0	50.1~75.0	75.1~100.0
TCLA	2		-	-	-
	3 4 5			-	-
	6			-	-
	8 10				
	12				
	15				
	16				
	20				
	25				
	30				
TCLSS	2		-	-	-
	3 4 5			-	-
	6			-	-
	8 10				
	12				
	15				
	16				
	20				
	25				
	30				

Ordering Example: Part Number - D - L
TCLB10 - 20 - 60.0

Standard Grade, Dimension Configurable

Part Number	V 0.5mm Increment (V3 or More)	D	H	T 1mm Increment	L 0.1mm Increment	Unit Price FTCLS	FTCLC	FTCLB	FTCLM FTCLBB	FTCLA	FTCLAB FTCLSS	FTCLCH	FTCLBH	FTCLMH	FTCLSK	FTCLSH
FTCLS FTCLC FTCLB FTCLM FTCLBB FTCLA FTCLAB FTCLSS FTCLCH FTCLBH FTCLMH FTCLSK FTCLSH	(Selection) 2.0 2.6 (0.5mm Increment) 3.0~55.0	4.0~10.0 (0.5mm Increment)	6.0~20.0 (0.5mm Increment)	1~20 (T≤L-1) FTCLBB (2≤T≤L-2)	10.0~ 25.0											
					25.1~ 50.0											
					50.1~ 75.0											
					75.1~ 100.0											
		10.5~20 (0.5mm Increment)	12.5~30 (0.5mm Increment)		10.0~ 25.0											
					25.1~ 50.0											
					50.1~ 75.0											
					75.1~ 100.0											
		21~30 (1mm Increment)	23~40 (1mm Increment)		10.0~ 25.0											
					25.1~ 50.0											
					50.1~ 75.0											
					75.1~ 100.0											
		31~40 (1mm Increment)	33~50 (1mm Increment)		10.0~ 25.0											
					25.1~ 50.0											
					50.1~ 75.0											
					75.1~ 100.0											
		41~50 (1mm Increment)	43~60 (1mm Increment)		10.0~ 25.0											
					25.1~ 50.0											
					50.1~ 75.0											
					75.1~ 100.0											
		51~60 (1mm Increment)	53~70 (1mm Increment)		10.0~ 25.0											
					25.1~ 50.0											
					50.1~ 75.0											
					75.1~ 100.0											

D–V Machining Conditions
10.0≤L≤50.0 ⋯› (D-V)/2≥1
50.1≤L≤100.0⋯› (D-V)/2≥3

D–V Machining Conditions
(FTCLSK, FTCLBB)
4≤D≤10⋯› V≤D-2
10.5≤D≤30⋯› V≤D-4
31≤D≤60⋯› V≤D-6

H-D≥2

D/10≤L≤Vx8

Ordering Example: Part Number - V - D - H - T - L
FTCLB - V10.5 - D20 - H30 - T4 - L23.8

Precision Grade, Dimension Configurable

Part Number	V (0.5mm Increment (V3 or More))	D	H	T (0.5mm Increment)	L (0.1mm Increment)	Unit Price FTCLMC	FTCLMB	FTCLMM	FTCMSH
FTCLMC FTCLMB FTCLMM FTCMSH	(Selection) 2.0 2.6 (0.5mm Increment) 3.0~55.0	4.0~10.0 (0.5mm Increment)	6.0~20.0 (0.5mm Increment)	1.0~20.0	10.0~ 25.0 25.1~ 50.0 50.1~ 75.0 75.1~100.0				
		10.5~20 (0.5mm Increment)	12.5~30 (0.5mm Increment)	2.0~20.0	10.0~ 25.0 25.1~ 50.0 50.1~ 75.0 75.1~100.0				
		21~30 (1mm Increment)	23~40 (1mm Increment)	3.0~20.0	10.0~ 25.0 25.1~ 50.0 50.1~ 75.0 75.1~100.0				
		31~40 (1mm Increment)	33~50 (1mm Increment)		10.0~ 25.0 25.1~ 50.0 50.1~ 75.0 75.1~100.0				
		41~50 (1mm Increment)	43~60 (1mm Increment)		10.0~ 25.0 25.1~ 50.0 50.1~ 75.0 75.1~100.0				
		51~60 (1mm Increment)	53~70 (1mm Increment)		10.0~ 25.0 25.1~ 50.0 50.1~ 75.0 75.1~100.0				

Ordering Example: Part Number - V - D - H - T - L
FTCLMB - V10.5 - D20 - H30 - T4 - L23.8

D–V Machining Conditions
4≤D≤10⋯› V≤D-2
10.5≤D≤30⋯› V≤D-4
31≤D≤60⋯› V≤D-6

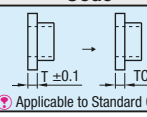
H-D≥2 T≤L-1 D/10≤L≤Vx8

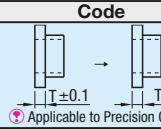
Alterations

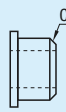
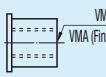
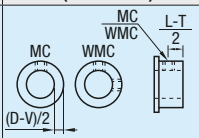
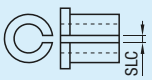
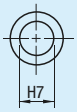
• Standard Grade
Part Number - V - D - H - T - L - (TCB, TCC, TCD, TCE, CC, VM, (VMA), MC, (WMC), SLC, VKC)
FTCLB - V10.5 - D20 - H30 - T4 - L23.8 - TCB

• Precision Grade
Part Number - V - D - H - T - L - (TSA, TSB, TSC, TSD, TSE, CC, VM, (VMA), MC, (WMC), SLC, VKC)
FTCLMB - V10.5 - D20 - H30 - T4 - L23.8 - TSB

⊗Not applicable to Standard Type. ⊗Not applicable to Anodized Products. ⊗Not applicable to Hardened Type (products with hardness indications H).

Alterations	Code	Negative Tolerance	Positive Tolerance	Zero, Negative Tolerance	Zero, Positive Tolerance
Standard Grade T Tolerance		TCB	TCC	TCD	TCE
	 Applicable to Standard Grade.	Changes shoulder thickness tolerance (T). T -0.1 -0.3 Ordering Code TCB	Changes shoulder thickness tolerance (T). T +0.3 +0.1 Ordering Code TCC	Changes shoulder thickness tolerance (T). T 0 -0.2 Ordering Code TCD	Changes shoulder thickness tolerance (T). T +0.2 0 Ordering Code TCE

Alterations	Code	Shoulder Thickness Tolerance	Negative Tolerance	Positive Tolerance	Zero, Negative Tolerance	Zero, Positive Tolerance
Precision Grade T Tolerance		TSA	TSB	TSC	TSD	TSE
	 Applicable to Precision Grade.	Changes shoulder thickness tolerance (T). T ±0.025 Ordering Code TSA	Changes shoulder thickness tolerance (T). T -0.01 -0.06 Ordering Code TSB	Changes shoulder thickness tolerance (T). T +0.06 +0.01 Ordering Code TSC	Changes shoulder thickness tolerance (T). T 0 -0.05 Ordering Code TSD	Changes shoulder thickness tolerance (T). T +0.05 0 Ordering Code TSE

Alterations	C Chamfering (One Side - Both Sides)	Tapping	Set Screw Hole (1-set 2-set)	Slitting	I.D. Tolerance
		Applicable to Dimension Configurable Type only. 		Combination with other alterations is not available. 	
Code	CC	VM (Coarse Thread) VMA (Fine Thread)	MC, WMC	SLC	VKC
Spec.	Chamfers C plane. Ordering Code CC1.5 CC=0.5mm Increment CC<(D-V) / 2	Adds a tapped hole (through). Ordering Code VM: V should be specified as VM or VMA. Ex.) FTCLS-VMA4-D10-H13-T18 L≤Mx8	Adds a tapped hole (coarse thread) at D part. Ordering Code MC3 WMC5 For the condition of thickness (D-V) / 2, see table below. L≥MC, WMCx3 MC, WMC=Select from table below.	Adds a slit. Ordering Code SLC For the condition of thickness (D-V) / 2, see table below. Slit width is fixed. D, V and L dimension tolerances are the values before alteration. They may change after alteration depending on materials.	Changes the I.D. Tolerance to H7. Ordering Code VKC Machining Conditions D≥6 V≥3 L≤Vx5

Tapped Hole Dia. VM•VMA | VM Pitch (Coarse) | VMA Pitch (Fine) | L max

4	0.7	0.5	20
5	0.8		30
6	1.0	0.75	35
8	1.25		40
10	1.5	1.0	50
12	1.75		55
16	2.0	1.5	90
18	-		100
20	2.5		

MC, WMC	(D-V)/2
3, 4	3 or More
5, 6, 8	5 or More
10, 12	8 or More

O.D. D	SLC	(D-V)/2
10.0~20.0	1	5 or Less
20.5~40	2	10 or Less
41~	3	20 or Less

D	D-V
6~10	D-V≥2
10.5~20	D-V≥3
21~30	D-V≥6
31~40	D-V≥8
41~50	D-V≥10
51~60	D-V≥12
61~70	D-V≥14
71~80	D-V≥16
81~90	D-V≥18
91~100	D-V≥20

Resin Washers / Collars - Properties and Features

■Properties of Resin Materials

- Polyacetal : This material offers excellent mechanical strength, and is used generally and widely. White color or Black color is selectable.
- MC Nylon : Superior to Polyacetal in abrasion resistance. Conductive Grade Model is also available, and is effective against static electricity.
- Bakelite : Serves as insulating part. In addition to Paper Base Type, Cloth Base Type is also offered with higher strength.
- Fluororesin : Excellent at impact resistance, chemical stability and electrical properties. This material also offers excellent sliding properties, and thus, is used for rotating areas.
- PEEK : Excellent at heat / chemical resistance. This material also offers excellent mechanical properties under high temperature.
- Epoxy Glass : Superior to Bakelite in strength and heat / humidity resistance.
- Polycarbonate : Has the top-level impact strength among transparent resin materials, and also offers excellent heat / cold resistance. Thus, this material is capable of wide application.
- Polyslider® : Excellent at sliding properties and abrasion resistance. This material is suitable for sliding / rotating areas.

■Resin Washers / Collars - Properties and Features

	Item		Testing Method (ASTM)	Unit	Material									
					Polyacetal	MC Nylon			Bakelite		Fluororesin Polytetra-fluoroethylene	PEEK Polyether Ether Ketone	Epoxy Glass	Polycarbonate
						Standard	Conductive Grade		Paper Base	Cloth Base				
							CDR2	CDR6						
Mechanical Properties	Tensile Strength		D638	MPa	61	96	68	74	113	97	13.7~34.3	98	309	59
	Elongation		D638	%	40	30	10	7	2.6	2	200~400	20	4	60~120
	Bending Strength	Vertical	D790	MPa	89	110	117	117	189	144	-	170	431	80.4
		Parallel	D790						182	148				
	Flexural Modulus		D790		2589	3530	4110	4020	9680	8650	550	4021	16300	2200
	Compression Strength	Vertical	D695		103	95	98	93	135	116	11.8	119	266	73.5
	5% Deformation	Parallel	D695						132	115				
	Izod Impact Strength (Notched)		D256	J/m	74	50	35	35	-	-	160	77	-	740~980
	Rockwell Hardness		D785	R/M Scale	R119 M78	R120	R119	R117	-	-	-	120	-	M60~70
Thermal Characteristics	Deflection Temperature under Load	0.45MPa	D648	°C	158	215			-	-	121	-	-	145
		1.82MPa		°C	110	200			206	230~	55	155	230~	-
	Ambient Operating Temperature		-	°C	-45~95	-40~120			-50~100		-40~250	-50~250	-150~180	~110
	Ref.: Destruction Temperature * Carbonization Start, Collapse, Dissolution Temperature		-	°C	165	222	215	215	-	-	327	340	-	-
	Linear Expansion Coefficient		D696	10 -5 /°C	9.0	9.0	8.0	7.5	-	-	9.9	5.0	1.55	6.0~7.0
	Thermal Conductivity		D177	W/m · k	0.233	0.233	0.512	0.709	0.21	0.38	0.25	0.25	0.47	0.19
Electrical Characteristics	Dielectric Constant	10^6 Hz	D150	-	3.7	3.7	-	-	4.24	5.33	18.6	3.3	-	3.0
	Dissipation Factor	10^6 Hz	D150	-	0.007	0.02	-	-	0.036	0.056	~2x10 $^{-4}$	3x10^{-3}	-	0.0012
	Specific Volume Resistivity		D257	Ω · cm	>10^{14}	4.2×10^{15}	10^2~10^4	10^4~10^6	-	-	>10^{18}	>10^{16}	10^{11}~10^{12}	>10^{17}
	Dielectric Breakdown Strength (Breakdown Voltage)		D149	kV/mm	20	20	-	-	29.5	18.6	19	19	23	15
	Arc Resistance		D495	sec	-	-	-	-	-	-	>300	23	180	-
Others	Specific Gravity		D792	-	1.41	1.16	1.2	1.23	1.4	1.4	2.14~2.2	1.32	1.8~1.85	1.2
	Moisture Absorption (At 23°Cx24h)		D570	%	0.22	0.8	-	-	0.5~1.3	1.6~1.8	<0.01	0.14	0.4	0.24
	Glass Fiber Content		-	-	-	-	-	-	-	-	-	-	Contain	-
	Food Sanitation Laws		-	-	Compliant	Compliant*	Compliant*		-	-	Compliant	Compliant	-	-
	Flame Resistance		[UL94]	-	(HB Equiv.)	(HB Equiv.)	(HB Equiv.)	(HB Equiv.)	-	-	(V-0 Equiv.)	(V-0 Equiv.)	-	-
Chemical Resistance	◎: Excellent ○: Good △: Questionable ×: Poor	Oil	-	-	○	○	○	○	-	-	○	◎	-	○
		Acid	-	-	△~×	×	×	×	-	-	○	◎	-	△
		Alkali	-	-	○	○~△	○~△	○~△	-	-	○	◎	-	×
		Organic Solvent	-	-	○	○	○	○	-	-	○	◎	-	×
Characteristics	◎: Excellent ○: Good △: Questionable ×: Poor	Sliding Properties	-	-	○	○	○	○	△	△	◎	○	△	△
		Heat Resistance	-	-	△	△	△	△	○	○	○	○	△~○	○
		Insulation	-	-	○	○	-	-	○	○	○	○	◎	◎
		Abrasion Resistance	-	-	△	○	△	△	×	×	○	○	×	×
		Dimension Stability	-	-	○	△	△	△	○	○	×	◎	○	○
		Machinability	-	-	◎	○	○	○	○	○	○	○	△	○

- * In compliance with Food Sanitation Laws (MC Nylon, Standard: After boiling for 1.5hrs; Conductive Grade: After boiling for 2hrs.) Listed values are for reference, not guaranteed.
- Do not store resin materials for prolonged duration to avoid dimensional deformation due to water absorption (Material with a higher moisture absorption rate will be deformed more.).
- Property values of Polycarbonate are obtained by JIS test (for reference).
- Bakelite may be discolored over time, but its properties do not change.
- For Properties of PolysliderR, see **P.145**.

■Washers / Collars

Shape		Material	Polyacetal		MC Nylon				Bakelite		Fluororesin Polytetra-fluoroethylene	PEEK Polyether Ether Ketone	Epoxy Glass	Polycarbonate	Polyslider®	Ceramic	Thermal Insulation Material
					Standard		Conductive Grade		Paper Base	Cloth Base							
		Color / Standard Size	White	Black	Blue	Ivory	CDR2	CDR6	Brown	Light Brown	White	Gray	Green	Transparent	Black	White	White
Washer	Standard	P.143 O.D. D 4~60 I.D. V 0~55 Thickness T 2~10	• T0.2 ~ 1.0 Available (White) P.145		•		•		•		• T0.1 ~ 1.0 Available P.145	•	•	T0.1 ~ 1.0 only P.145	T0.13 ~ 1.0 only P.145	• D10~45 V 3~20 T 3~5	• D10~25 V 3~10 T 3~5
	Flanged Solid	P.146 O.D. D 6~60 Nose Dia. V 2~58 Thickness T 3~50	•		•		•	• D6~50	•	•	• D6~50	• D6~50	• D6~50	-	-	-	-
	Flanged	P.146 O.D. D 4~60 Flange Dia. H 6~70 I.D. V 0~55 Overall Length L 2~10	•		•		•		•	•	•	•	•	-	-	-	-
	Counterbored	P.151 O.D. D10~60 I.D. P 3~53 Thickness T 3~50	•		•		•	• D10~50	•	•	• D10~50	• D10~50	• D10~50	-	-	-	-
	Square Resin Washer	P.156 Length A 6~25 Width B 6~100 Thickness T 2~10	•	-	•	-	-	-	-	-	-	-	-	-	-	-	-
Collar	Standard	P.147 O.D. D 4~100 I.D. V 2~55 Overall Length L10~100	•		•		•	• D4~50	•	•	• D4~50	• D4~50	• D4~50	-	-	• D6~25 V 3~20 L 5~100	• D8~20 V 3~10 L 10~30
	Flanged	P.149 O.D. D 4~100 Flange Dia. H 6~110 I.D. V 0~90 Overall Length L10~100	•		•		•	• D4~50	•	•	• D4~50	• D4~50	• D4~50	-	-	• D6~25 H10~45 V 3~20 L 8~25	• D8~20 H12~30 V 3~10 L 10~20
	With Guide	P.152 O.D. D 8~30 I.D. V 3~20 Overall Length L 2~50	•	-	•	-	-	-	-	-	-	-	-	-	-	-	-

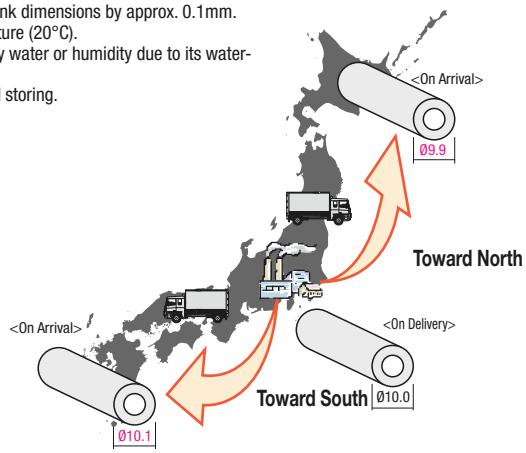
• Product Available - Product Not Available

About Designing of Resin Parts

Unlike metals, resin is the most likely to deform or change in dimensions due to temperature or humidity.
Upon designing, pay attention to the following.

■Alteration of Dimensions

1 °C level temperature change may expand or shrink dimensions by approx. 0.1mm.
Be sure to store purchased parts at room temperature (20°C).
MC Nylon especially tends to expand or contract by water or humidity due to its water-absorbing property.
Pay extra attention to the dimension designing and storing.



If dimensions-changed parts are put in room temperature for a while, they may be brought back to their original dimensions state in some degree.

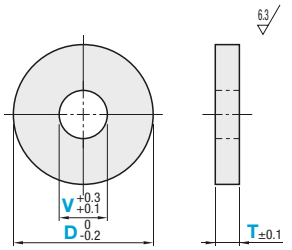
Resin Washers / Resin Washer Bulk Packages

Standard / Dimension Configurable

■When you need large quantities, Bulk Packages are more economical.



Type			Material		Color
Pkg.	Dimension Selectable	Dimension Configurable			
PACK-WSJJ	WSJJ	FWSJJ	Polyacetal		White
-	WSJK	FWSJK			Black
PACK-WSJM	WSJM	FWSJM	MC Nylon Standard Grade		Blue
-	WSJW	FWSJW			Ivory
-	WSJD	FWSJD	MC Nylon Conductive Grade	CDR2	Black
-	WSJT	FWSJT		CDR6	
-	WSJB	FWSJB	Bakelite	Paper Base	Brown
-	WSJN	FWSJN		Cloth Base	Light Brown
-	WSJF	FWSJF	Fluororesin		White
-	WSJP	FWSJP	PEEK		Gray
-	WSJE	FWSJE	Epoxy Glass		Green



RoHS

Material Properties P.141

■**Sold by the package** 1 package contains 10 pieces.

Part Number		V Selection	T Selection	PACK-WSJJ				PACK-WSJM			
				Unit Price	Volume Discount Rate			Unit Price	Volume Discount Rate		
Type	D			1 ~ 4 pkg(s).	5~9	10~19	20~30	1 ~ 4 pkg(s).	5~9	10~19	20~30
	4	2	2								
	5	2 3	2								
	6	2 3 4	2								
PACK-WSJJ	8	3 4 5 6	2 3 5								
PACK-WSJM	10	3 4 5 6 8	2 3 5								
	12	4 5 6 8	2 3								
	15	6 8 10 12	2 3								
	20	6 8 10 12	2 3 5								

For package, minimum order unit is 1 pack.

For orders of 31 or more identical packages, please request a quotation.

Ordering Example

• **Sold by the package**

Part Number	-	V	-	T
PACK-WSJJ4	-	2	-	2

■**Dimension Selectable**

No specification available for those without value.

Part Number		V Selection	T Selection	Unit Price								
				WSJJ WSJK	WSJM WSJW	WSJD	WSJT	WSJB	WSJN	WSJF	WSJP	WSJE
Type	D											
	4	2	2									
	5	2 3	2									
	6	2 3 4	2									
WSJJ	8	2 3 4 5 6	2 3 5									
WSJK	10	2 3 4 5 6 8	2 3 5									
WSJM	12	3 4 5 6 8 10	2 3 5									
WSJW	13	4 5 6 8 10	2 3 5									
WSJD	14	4 5 6 8 10	2 3 5									
WSJT	15	4 5 6 8 10 12	2 3 5									
WSJB	16	4 5 6 8 10 12	2 3 5									
WSJN	20	4 5 6 8 10 12 15 16	2 3 5									
WSJF	25	6 8 10 12 15 16 20	2 3 5									
WSJP	30	8 10 12 15 16 20 25	2 3 5									
WSJE	35	10 12 15 16 20 25	3 5 10									
	40	10 12 15 16 20 25 30	3 5 10									
	50	10 12 15 16 20 25 30	3 5 10									
	60	15 16 20 25 30	3 5 10				-			-	-	-

Ordering Example

Part Number	-	V	-	T
WSJJ6	-	4	-	2

■Dimension Configurable

No specification available for those without value.

Part Number	D	V	T	Unit Price								
		0.5mm Increment (V3 or More)	0.5mm Increment	FWSJJ FWSJK	FWSJM FWSJW	FWSJD	FWSJT	FWSJB	FWSJN	FWSJF	FWSJP	FWSJE
FWSJJ FWSJK FWSJM FWSJW FWSJD FWSJT FWSJB FWSJN FWSJF FWSJP FWSJE	4.0~10 (0.5mm Increment)	0 (No Hole Machining) 2.0 2.6 3.0~58.0 (V≤D-2) 58.5~90.0 (V≤D-6)	2.0~ 5.0									
			5.5~10									
	10.5~20 (0.5mm Increment)		2.0~ 5.0									
			5.5~10									
	21~30 (1mm Increment)		2.0~ 5.0									
			5.5~10									
	31~40 (1mm Increment)		2.0~ 5.0									
			5.5~10									
	41~50 (1mm Increment)		2.0~ 5.0									
			5.5~10									
	51~60 (1mm Increment)		2.0~ 5.0				-			-	-	-
			5.5~10				-			-	-	-
	61~80 (1mm Increment)		2.0~ 5.0				-			-	-	-
			5.5~10				-			-	-	-
	81~100 (1mm Increment)		2.0~ 5.0				-			-	-	-
			5.5~10				-			-	-	-

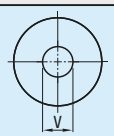
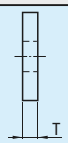
Ordering Example

Part Number	-	D	-	V	-	T
FWSJN	-	D10	-	V5	-	T5.5

Alterations

Part Number	-	D	-	V	-	T	-	(VKC, TKC)
WSJJ6			-	4	-	2	-	VKC
FWSJM	-	D10	-	V4	-	T2	-	TKC

Alterations are applicable to WSJJ, WSJM, FWSJJ and FWSJM only.

Alterations	I.D. Tolerance Change	Thickness Tolerance Change
		
Code	VKC	TKC
Spec.	Changes the I.D. tolerance to $^{+0.1}_{0}$. Ordering Code VKC When D≤50, D-V≥6 When 51≤D≤80, D-V≥10 When 81≤D≤100, D-V≥16	Changes the Thickness Tolerance to ±0.05. Ordering Code TKC When D≤50, D-V≥6 When D≤80, D-V≥10 When D≤100, D-V≥16

Extra Thin Resin Washers / Extra Thin Resin Washer Bulk Packages

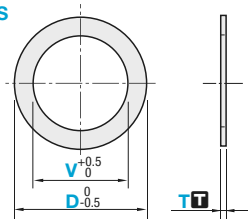
■Extra thin washer with excellent low friction and abrasion resistance.

■Extra Thin Resin Washers- Abrasion Resistant



RoHS

SWSPS



Material: Polyslider® (Nylon Resin)

Polyslider® is a registered trademark of ASAHI POLYSLIDER COMPANY, LIMITED.

Part Number Type	D	V	T	Unit Price
SWSPS	8	3 4 5	0.13 0.25 0.5 1.0	
	10	4 5 6		
	12	4 5 6 8		
	14	5 6 8 10		
	15	5 6 8 10 12		
	16	6 8 10 12		
	20	6 8 10 12 15 16		
	25	6 8 10 12 15 16 20	0.25 0.5	

■Tolerance

T Thickness (T) Tolerance			
0.13	0.25	0.5	1.0
±0.013	±0.025	±0.05	±0.1

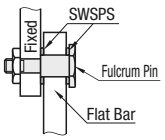
■Comparison Table

Item	Polyslider®	Fluororesin
Abrasion Resistance	◎	○
Compression Strength	◎	×
Sliding Properties	○	◎
Characteristics	Crush and abrasion resistant.	Low friction and not crush resistant.

■Property Data

Item	Unit	Value
Tensile Strength	MPa	98
Elongation	%	60
Friction Coefficient	μ	0.16~0.4
Insulation Resistance	kV/mm	45

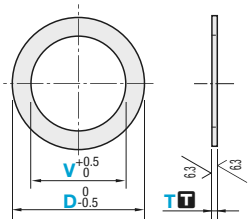
CX Example



■Extra Thin Resin Washers- Polyacetal, Fluororesin, Polycarbonate

RoHS

Type		M Material	Color	T Thickness (T) Tolerance				
Washer	Washer Package			0.1	0.2	0.3	0.5	1.0
SWSJJ	PACK-SWSJJ	Polyacetal	White	-	±0.03	±0.04	±0.07	±0.10
SWSPT	PACK-SWSPT	Fluororesin	White	±0.01	±0.02	±0.03	±0.05	
SWSPP	PACK-SWSPP	Polycarbonate	Transparent					



■When you need large quantities, Bulk Packages are more economical. PACK-SWS□□ contains 10 pieces.

Part Number Type	D	V Selection	T Selection	Unit Price PACK-SWSJJ	PACK-SWSPT	SWSJJ	SWSPT
PACK-SWSJJ PACK-SWSPT SWSJJ SWSPT	8	0 3 4	*0.1 0.2 0.3 0.5 1.0				
	10	0 3 4 5 6					
	12	0 4 5 6 8					
	14	0 4 5 6 8 10					
	15	0 4 5 6 8 10 12					
	16	0 4 5 6 8 10 12					
	20	0 5 6 8 10 12 15 16					
	25	0 6 8 10 12 15 16 20					
	30	0 8 10 12 15 16 20 25					
	35	0 10 12 15 16 20 25 30					
	40	0 10 12 15 16 20 25 30					
	50	0 12 15 16 20 25 30 35 40					

*PACK-SWSJJ and SWSJJ are not available for T0.1.

Part Number Type	D	V Selection	T Selection	Unit Price PACK-SWSPP	SWSPP
PACK-SWSPP SWSPP	8	0 3 4	0.1 0.2 0.3 0.5 1.0		
	10	0 3 4 5 6			
	12	0 4 5 6 8			
	15	0 5 6 8 10			
	16	0 5 6 8 10 12			
	20	0 6 8 10 12 15 16			
	25	0 6 8 10 12 15 16			
	30	0 8 10 12 15 16 20			
	35	0 20 25 30			
	40	0 20 25 30			
	50	0 30 35 40			

For package, minimum order unit is 1 pack.

Ordering Example

Part Number	-	V	-	T
PACK-SWSJJ8	-	3	-	0.5
SWSPS8	-	3	-	0.5

Resin Washer

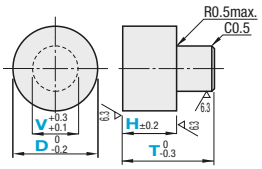
Flanged Solid / Flanged

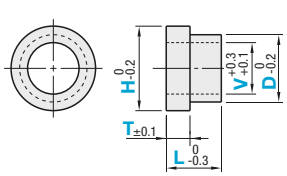


RoHS

Flanged Solid	Flanged	Material		Color
FWNJJ	FWHJ	Polyacetal		White
FWNJK	FWHJK			Black
FWNJM	FWHJM	MC Nylon Standard Grade		Blue
FWNJW	FWHJW			Ivory
FWNJD	FWHJD	MC Nylon Conductive Grade	CDR2	Black
FWNJT	FWHJT		CDR6	
FWNJB	FWHJB	Bakelite	Paper Base	Brown
FWNJN	FWHJN		Cloth Base	Light Brown
FWNJF	FWHJF	Fluororesin		White
FWNJP	FWHJP	PEEK		Gray
FWNJE	FWHJE	Epoxy Glass		Green

Material Properties P.141





Flanged Solid

Part Number	D	V 0.5mm Increment	H 0.5mm Increment	T 0.5mm Increment	Unit Price FWNJJ FWNJK	FWNJM FWNJW	FWNJD	FWNJT	FWNJB	FWNJN	FWNJF	FWNJP	FWNJE
FWNJJ FWNJK FWNJM FWNJW	6.0~10.0 (0.5mm Increment)	2.0~8.0	2.0~28.0	3.0~10.0									
				10.5~20									
				20.5~30									
	10.5~20 (0.5mm Increment)	4.0~18.0		3.0~10.0									
				10.5~20									
				20.5~30									
	21~30 (1mm Increment)	10.0~28.0		3.0~10.0									
				10.5~20									
				20.5~30									
FWNJD FWNJT FWNJB FWNJN	31~40 (1mm Increment)	15.0~38.0	2.0~38.0	5.0~10.0									
				10.5~20									
				20.5~30									
				30.5~40									
FWNJF FWNJP FWNJE	41~50 (1mm Increment)	20.0~48.0	2.0~48.0	10.0~20.0									
				20.5~30									
				30.5~40									
				40.5~50									
	51~60 (1mm Increment)	30.0~58.0		10.0~20.0				-			-	-	-
				20.5~30									
				30.5~40									
				40.5~50									

Machining Conditions V≤D-2 V×3≥T-H≥1 V≤2.5⋯→T≤10 V=3.0⋯→T≤20

Ordering Example

Part Number	-	D	-	V	-	H	-	T
FWNJN	-	D19.5	-	V11.5	-	H10.5	-	T25.0

Flanged

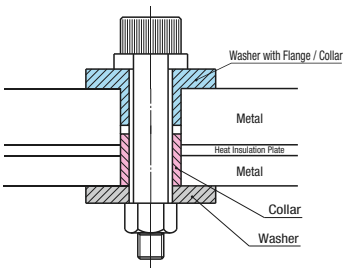
Part Number	D	H	V 0.5mm Increment (V3 or More)	T 0.5mm Increment	L 0.5mm Increment	Unit Price FWHJ FWHJK	FWHJM FWHJW	FWHJD	FWHJT	FWHJB	FWHJN	FWHJF	FWHJP	FWHJE
FWHJ FWHJK FWHJM FWHJW FWHJD FWHJT FWHJB FWHJN FWHJF FWHJP FWHJE	4.0~10 (0.5mm Increment)	6.0~20 (0.5mm Increment)	0 2.0 2.6 3.0~55.0	1.0~8.0	2.0~5.5									
					6.0~10.0									
	10.5~20 (0.5mm Increment)	12.5~30 (0.5mm Increment)			2.0~5.5									
					6.0~10.0									
	21~30 (1mm Increment)	23~40 (1mm Increment)			2.0~5.5									
					6.0~10.0									
	31~40 (1mm Increment)	33~50 (1mm Increment)			2.0~5.5									
					6.0~10.0									
	41~50 (1mm Increment)	43~60 (1mm Increment)			2.0~5.5									
					6.0~10.0									
	51~60 (1mm Increment)	53~70 (1mm Increment)			2.0~5.5				-			-	-	-
					6.0~10.0				-			-	-	-

Machining Conditions H-D≥2 D-V≥2 L-T≥1 For FWHJT, FWHJF, FWHJP and FWHJE, H≤50

Ordering Example

Part Number	-	D	-	H	-	V	-	T	-	L
FWHJN	-	D20	-	H30	-	V10.5	-	T2.5	-	L8.5

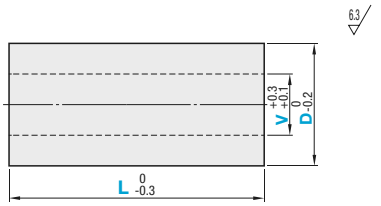
EX Example



Resin Collar
Standard



Dimension Selectable	Dimension Configurable	Material		Color
CLJJ	FCLJJ	Polyacetal		White
CLJK	FCLJK			Black
CLJM	FCLJM	MC Nylon Standard Grade		Blue
CLJW	FCLJW			Ivory
CLJD	FCLJD	MC Nylon Conductive Grade	CDR2	Black
CLJT	FCLJT		CDR6	
CLJB	FCLJB	Bakelite	Paper Base	Brown
CLJN	FCLJN		Cloth Base	Light Brown
CLJF	FCLJF	Fluororesin		White
CLJP	FCLJP	PEEK		Gray
CLJE	FCLJE	Epoxy Glass		Green



Material Properties P.141

Dimension Selectable

Part Number Type	V	D Selection	L 0.5mm Increment	Unit Price CLJJ CLJK	CLJM CLJW	CLJD	CLJB	CLJN	CLJT	CLJF	CLJP	CLJE
CLJJ CLJK CLJM CLJW CLJD CLJT CLJB CLJN CLJF CLJP CLJE	2 3	(4) 5 6 8 10 11 12 (4)···V2 only	10.0 ~ 25.0									
			25.5 ~ 30.0									
	4 5	(6) 8 10 11 12 13 14 15 16 20 (6)···V4 only	10.0 ~ 25.0									
			25.5 ~ 50.0									
	6	8 10 11 12 13 14 15 16 20 25	10.0 ~ 25.0									
			25.5 ~ 50.0									
	8	10 11 12 13 14 15 16 20 25 30	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
	10	12 13 14 15 16 20 25 30	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
		35 40 50	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
	12	15 16 20 25 30	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
		35 40 50	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
	15 16	20 25 30	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
		35 40 50	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
		60	10.0 ~ 25.0						-	-	-	-
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
	20 25	(25) 30 (25)···V20 only	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
		35 40 50	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
		60	10.0 ~ 25.0						-	-	-	-
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
	30	40 50	10.0 ~ 25.0									
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									
		60	10.0 ~ 25.0						-	-	-	-
			25.5 ~ 50.0									
			50.5 ~ 75.0									
			75.5 ~ 100.0									

No specification available for those without value.

Ordering Example

Part Number	-	D	-	L
CLJJ10	-	16	-	20.0

■Dimension Configurable

Part Number	V V2.6 or Less Selection V3.0 or More: 0.5mm Increment	D D4 ~ 20: 0.5mm Increment D21 or More: 1mm Increment	L 0.5mm Increment	Unit Price FCLJJ FCLJK	FCLJM FCLJW	FCLJD	FCLJB	FCLJN	FCLJT	FCLJF	FCLJP	FCLJE
FCLJJ FCLJK FCLJM FCLJW FCLJD FCLJT FCLJB FCLJN FCLJF FCLJP FCLJE	0 (No Hole Machining) 2.0 2.6 3.0~55.0 (0.5mm Increment) L≤ 50.0 ···› V≤D-2 L≥ 50.5 ···› V≤D-6	4.0~10 (0.5mm Increment) D≤5···›L≤50	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0									
		10.5~20 (0.5mm Increment)	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0									
		21~30 (1mm Increment)	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0									
		31~40 (1mm Increment)	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0									
		41~50 (1mm Increment)	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0									
		51~60 (1mm Increment)	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0						-	-	-	-
	0 (No Hole Machining) 3.0~90.0 (0.5mm Increment) V≤D-6	61~80 (1mm Increment)	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0						-	-	-	-
		81~100 (1mm Increment)	10.0~ 25.0 25.5~ 50.0 50.5~ 75.0 75.5~100.0						-	-	-	-
		Machining Conditions	L ≤Vx8						No specification available for those without value.			

Ordering Example

Part Number	-	V	-	D	-	L
FCLJB	-	V20	-	D30	-	L18.5

Alterations

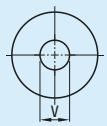
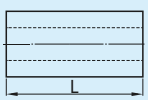
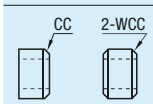
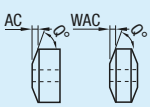
• Dimension Selectable

Part Number	-	D	-	L	-	(CC, WCC, AC···etc.)
CLJJ12	-	30	-	45	-	AC10 - Q15

• Dimension Configurable

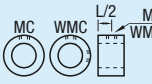
Part Number	-	V(VM, VMA)	-	D	-	L	-	(CC, WCC, AC···etc.)
FCLJP	-	VM10	-	D35	-	L60	-	CC2.5

⊗Material: Not applicable to Bakelite, Epoxy Glass and Fluororesin. Alterations except VKC and LKC are available from D10.

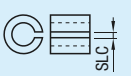
Alterations	Code	Spec.
	VKC	Changes the I.D. tolerance to $^{+0.1}_{0}$. Applicable to CLJJ, CLJM, FCLJJ and FCLJM only. Ordering Code VKC L≤50 When D≤50, D-V≥6 When D≤80, D-V≥10 When D≤100, D-V≥16
	LKC	Changes the overall length tolerance to ±0.05. Applicable to CLJJ, CLJM, FCLJJ and FCLJM only. Ordering Code LKC L≤50 When D≤50, D-V≥6 When D≤80, D-V≥10 When D≤100, D-V≥16
	CC WCC	Chamfers C plane. Ordering Code CC1.5 WCC2.5 CC, WCC=0.5mm Increment CC, WCC<(D-V) / 2
	AC WAC	Adds a taper. Ordering Code AC3.5-Q60 WAC5.0-Q30 AC, WAC=0.5mm Increment Q=Selection from 15, 20, 30 and 60 AC≤L-5 (D-V)/2-AC, WAC tan Q≥1 Ref.tan15°=0.268 tan20°=0.364 tan30°=0.577 tan60°=1.732

Alterations	Code	Spec.
Applicable to Dimension Configurable Type only. 	VM (Coarse Thread) VMA (Fine Thread)	Adds a tapped hole (through). Ordering Code VM4: V should be specified as VM or VMA. Ex.) FCLJJ–VMA4–D10–L18 For machining limits of tap diameter and full length (L), see the table on the right. Tap dia.≤D / 2

Tapped Hole Dia. VM, VMA	VM Pitch (Coarse)	VMA Pitch (Fine)	L max
4	0.7	0.5	20
5	0.8		30
6	1.0	0.75	35
8	1.25		45
10	1.5	1.0	60
12	1.75		70
16	2.0	1.5	90
18	-		100
20	2.5		

	MC WMC	Adds a tapped hole (coarse thread) at D part. Ordering Code MC3 WMC5 For the condition of thickness (D-V) / 2, see the table below. L≥MC, WMCx3 MC, WMC=Select from the table below.

MC, WMC	(D-V) / 2
3, 4	3 or More
5, 6, 8	5 or More
10, 12	8 or More

Combination with other alterations is not available. 	SLC	Adds a slit. Ordering Code SLC For the condition of thickness (D-V) / 2, see the table below. Slit width is fixed. I.D. / O.D. tolerances are the values before alteration. They may change after alteration depending on materials.

O.D. D	SLC	(D-V) / 2
10.0~20.0	1	5 or Less
20.5~40	2	10 or Less
41~	5	20 or Less

Resin Collar

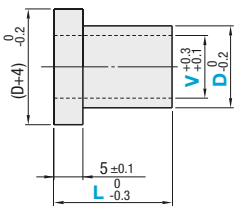
Flanged



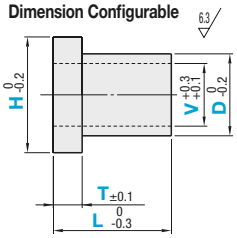
RoHS

Dimension Selectable	Dimension Configurable	Material		Color
CLJHJ	FCLJHJ	Polyacetal		White
CLJHK	FCLJHK			Black
CLJHM	FCLJHM	MC Nylon Standard Grade		Blue
CLJHW	FCLJHW			Ivory
CLJHD	FCLJHD	MC Nylon Conductive Grade	CDR2	Black
CLJHT	FCLJHT		CDR6	
CLJHB	FCLJHB	Bakelite	Paper Base	Brown
CLJHN	FCLJHN		Cloth Base	Light Brown
CLJHF	FCLJHF	Fluororesin		White
CLJHP	FCLJHP	PEEK		Gray
CLJHE	FCLJHE	Epoxy Glass		Green

Dimension Selectable



Dimension Configurable



Material Properties P.141

Dimension Selectable

Part Number Type	V	D Selection	L 0.5mm Increment	Unit Price CLJHJ CLJHK	CLJHM CLJHW	CLJHD	CLJHB	CLJHN	CLJHT	CLJHF	CLJHP	CLJHE
CLJHJ CLJHK CLJHM CLJHW CLJHD CLJHT CLJHB CLJHN CLJHF CLJHP CLJHE	2 3	(4) 5 6 8 10 (4)···V2 only	10.0~ 25.0									
			25.5~ 30.0									
	4 5	(6) 8 10 11 12 13 14 15 16 20 25 (6)···V4 only	10.0~ 25.0									
			25.5~ 50.0									
	6	8 10 11 12 13 14 15 16 20 25	10.0~ 25.0									
			25.5~ 50.0									
	8	10 11 12 13 14 15 16 20 25 30	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
	10	12 13 14 15 16 20 25 30	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
		35 40 50	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
	12	15 16 20 25 30	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
		35 40 50	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
	15	20 25 30	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
		35 40 50	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
	16	60	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
	20	(25) 30 (25)···V20 only	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
		35 40 50	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
	25	60	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
	30	40 50	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									
		60	10.0~ 25.0									
			25.5~ 50.0									
			50.5~ 75.0							-	-	-
			75.5~100.0									

H≤50 for CLJHT, CLJHF, CLJHP and CLJHE.

No specification available for those without value.

Ordering Example: Part Number - D - L

CLJHM10 - 16 - 20.0

■Dimension Configurable

Part Number	V W2.6 or Less Selection V3.0 or More, 0.5mm Increments	D 0.5mm Increment D21 or More: 1mm Increment	H 0.5mm Increment H93 or More: 1mm Increment	T 1mm Increment	L 0.5mm Increment	Unit Price FCLJHJ FCLJHK	FCLJHM FCLJHW	FCLJHD	FCLJHT	FCLJHB	FCLJHN	FCLJHF	FCLJHP	FCLJHE
FCLJHJ FCLJHK FCLJHM FCLJHW FCLJHD FCLJHT FCLJHB FCLJHN FCLJHF FCLJHP FCLJHE	0 (No Hole Machining) 2.0 2.6 3.0~58.0 (0.5mm Increment) 10.0 ≤L≤ 50.0 ···› V≤D–2 50.5 ≤L≤ 100 ···›V≤D–6 58.5~90.0 V≤D–6	4.0~10 (0.5mm Increment)	6.0~20 (0.5mm Increment)	2~20 L–T≥1	10.0~ 25.0									
					25.5~ 50.0									
					50.5~ 75.0							-	-	-
					75.5~100.0									
		10.5~20 (0.5mm Increment)	12.5~30 (0.5mm Increment)		10.0~ 25.0									
					25.5~ 50.0									
					50.5~ 75.0							-	-	-
					75.5~100.0									
		21~30 (1mm Increment)	23~40 (0.5mm Increment)		10.0~ 25.0									
					25.5~ 50.0									
					50.5~ 75.0							-	-	-
					75.5~100.0									
		31~40 (1mm Increment)	33~50 (0.5mm Increment)		10.0~ 25.0									
					25.5~ 50.0									
					50.5~ 75.0							-	-	-
					75.5~100.0									
		41~50 (1mm Increment)	43~60 (0.5mm Increment)		10.0~ 25.0									
					25.5~ 50.0									
					50.5~ 75.0							-	-	-
					75.5~100.0									
		51~60 (1mm Increment)	53~70 (0.5mm Increment)		10.0~ 25.0				-					
					25.5~ 50.0							-	-	-
					50.5~ 75.0									
					75.5~100.0									
		61~80 (1mm Increment)	63~90 (0.5mm Increment)		10.0~ 25.0				-					
					25.5~ 50.0							-	-	-
					50.5~ 75.0									
					75.5~100.0									
		81~100 (1mm Increment)	83~110 (1mm Increment)		10.0~ 25.0				-					
					25.5~ 50.0							-	-	-
					50.5~ 75.0									
					75.5~100.0									

Machining Conditions (?) H–D≥2 (?) D4~5···›Lmax=50 (?) L≤Vx8 (?) H≤50 for FCLJHT, FCLJHF, FCLJHP and FCLJHE.

(?) No specification available for those without value.

Ordering Example

Part Number - V - D - H - T - L

FCLJHM - V15 - D21 - H26 - T6 - L50.5

Alterations

• **Dimension Selectable**

Part Number - D - L - (CC, SLC···etc.)

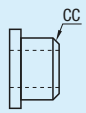
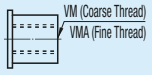
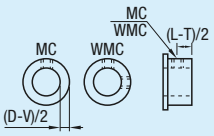
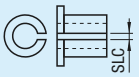
CLJHM15 - 35 - 75.5 - SLC

• **Dimension Configurable**

Part Number - V (VM, VMA) - D - H - T - L - (CC, SLC···etc.)

FCLJHT - VMA18 - D25 - H28 - T5 - L15 - MC3

⊗Material: Not applicable to Bakelite, Epoxy Glass and Fluororesin. (?) Alteration is available from D10.

Alterations	C Chamfering (One Side - Both Sides)	Tapping	Set Screw Hole (1-set 2-set)	Slitting
		(?) Applicable to Dimension Configurable Type only. 		(?) Combination with other alterations is not available. 
Code	**CC**	**VM** (Coarse Thread) **VMA** (Fine Thread)	**MC, WMC**	**SLC**
Spec.	Chamfers C plane. Ordering Code CC1.5 (?) CC=0.5mm Increment (?) 0.5≤CC<(D-V)/2	Adds a tapped hole (through). Ordering Code VM4: V should be specified as VM or VMA. Ex.) FCLJHJ - VM4 - D10 - H15 - T6 - L10 (?) For the machining limits of tap dia. and overall length (L), see the table below. Tap dia.≤D/2	Adds a tapped hole (coarse thread) at D part. Ordering Code MC3 WMC5 (?) For the condition of thickness (D-V) / 2, see the table below. (?) L≥MC, WMCx3 (?) MC, WMC=Select from table below.	Adds a slit. Ordering Code SLC (?) For the condition of thickness (D-V) / 2, see the table below. (?) Slit width is fixed.

Tapped Hole Dia. VM, VMA	VM Pitch (Coarse)	VMA Pitch (Fine)	L max
4	0.7	0.5	20
5	0.8		30
6	1.0	0.75	35
8	1.25		45
10	1.5	1.0	60
12	1.75		70
16	2.0	1.5	90
18	-		100
20	2.5		

MC, WMC	(D-V)/2
3, 4	3 or More
5, 6, 8	5 or More
10, 12	8 or More

O.D. D	SLC	(D-V)/2
10.0~20.0	1	5 or Less
20.5~40	2	10 or Less
41~	5	20 or Less

(?) I.D./O.D. tolerances are the values before alteration. They may change after alteration depending on materials.

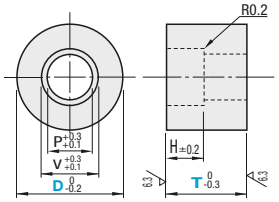
Resin Collar
Counterbored / Tapped



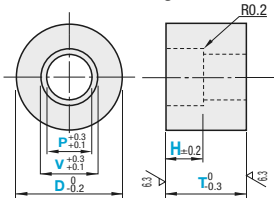
Standard	Dimension Configurable	Material		Color
WZJJ	FWZJJ	Polyacetal		White
-	FWZJK			Black
WZJM	FWZJM	MC Nylon Standard Grade		Blue
-	FWZJW			Ivory
WZJD	FWZJD	MC Nylon Conductive Grade	CDR2	Black
-	FWZJT		CDR6	
WZJB	FWZJB	Bakelite	Paper Base	Brown
WZJN	FWZJN		Cloth Base	Light Brown
-	FWZJF	Fluororesin		White
-	FWZJP	PEEK		Gray
-	FWZJE	Epoxy Glass		Green

Material Properties P.141

Standard



Dimension Configurable



Standard

Part Number Type	D	T Selection	H	V	P	Unit Price WZJJ	WZJM	WZJD	WZJB	WZJN
WZJJ WZJM WZJD WZJB WZJN	10	6 8	4	6	3.5					
	12	8 10	5	8	4.5					
	14	8 10	6	10	5.5					
	15	10 12	8	11	6.5					
	20	10 12 15	8	11	6.5					
	30	12 15	10	14	9					
	40	15 20	12	18	11					
	50	15 20	12	18	11					
	60	15 20	12	18	11					

Ordering Example: Part Number - T
WZJB15 - 12

Dimension Configurable

Part Number	D	V 0.5mm Increment	P 0.5mm Increment	H 0.5mm Increment	T 0.5mm Increment	Unit Price FWZJJ FWZJK	FWZJM FWZJW	FWZJD	FWZJT	FWZJB	FWZJN	FWZJF	FWZJP	FWZJE
FWZJJ FWZJK FWZJM FWZJW FWZJD FWZJT FWZJB FWZJN FWZJF FWZJP FWZJE	10.0~20 (0.5mm Increment)	5.0~55.0 (V≤D-2)	3.0~53.0 (P≤V-2)	1.0~48.0 (T-H≤Px8)	3.0~10.0									
					10.5~20									
					20.5~30									
					30.5~40									
					40.5~50									
	21~30 (1mm Increment)				3.0~10.0									
					10.5~20									
					20.5~30									
					30.5~40									
					40.5~50									
	31~40 (1mm Increment)				3.0~10.0									
					10.5~20									
					20.5~30									
					30.5~40									
					40.5~50									
	41~50 (1mm Increment)				3.0~10.0									
					10.5~20									
					20.5~30									
					30.5~40									
					40.5~50									
	51~60 (1mm Increment)				3.0~10.0				-			-	-	-
					10.5~20									
					20.5~30									
					30.5~40									
					40.5~50									

Machining Conditions: V≤D-2 P≤V-2 2≤(T-H)≤Px8 — No specification available for those without value.

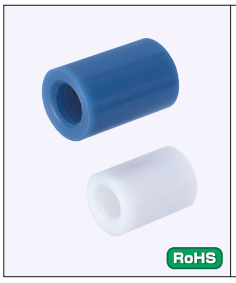
Ordering Example: Part Number - D - V - P - H - T
FWZJJ - D25 - V10.5 - P6.5 - H5.0 - T15.5

Alterations: Part Number - D - V - P(PM, PMA) - H - T
FWZJM - D20 - V16 - PM8 - H5 - T15

Not applicable to Bakelite, Epoxy Glass and Fluororesin.

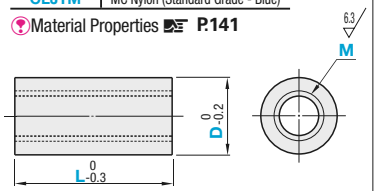
Alterations	Code	Spec.
PM (Coarse Thread) PMA (Fine Thread) T-H	PM (Coarse Thread) PMA (Fine Thread)	Adds a tapped hole on P Hole part. Ordering Code PM4 Specify PM instead of P. For machining limits of T-H, see the table on the right. Tap dia.≤D/2

Tapped Hole Dia. PM, PMA	PM Pitch (Coarse)	PMA Pitch (Fine)	T-H Max
4	0.7	0.5	20
5	0.8		30
6	1.0	0.75	35
8	1.25		40
10	1.5	1.0	50
12	1.75		
16	2.0	1.5	
18	-		
20	2.5		



Type	Material
CLJTJ	Polyacetal
CLJTM	MC Nylon (Standard Grade - Blue)

Material Properties P.141



Resin Collar-Tapped

Part Number Type	M(xPitch)	D	L 0.5mm Increment	Unit Price CLJTJ	CLJTM
CLJTJ CLJTM	4 (x0.7) 5 (x0.8) 6 (x1.0) 8 (x1.25)	10.0~20.0 (0.5mm Increment)	10.0~25.0		
			25.5~50		
		21~30 (1mm Increment)	10.0~25.0		
			25.5~50		
			50.5~60		
	8A (x1.0) 10 (x1.5) 12 (x1.75) 12A (x1.0) 16 (x2.0) 18A (x1.0) 20 (x2.5)	31~40 (1mm Increment)	10.0~25.0		
			25.5~50		
			50.5~60		
		41~50 (1mm Increment)	10.0~25.0		
			25.5~50		
			50.5~60		
		51~60 (1mm Increment)	10.0~25.0		
			25.5~50		
			50.5~60		

D-M ≥6 L≤Mx3

Ordering Example: Part Number - D - L
CLJTM10 - D30 - L30

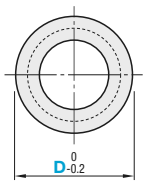
Resin Collar
With Guide

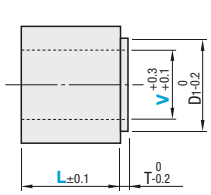


RoHS

Type	Material	Color
CLJGJ	Polyacetal	White
CLJGM	MC Nylon Standard Grade	Blue

Material Properties P.141





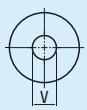
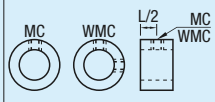
Part Number Type	D	V	L 0.5mm Increment	D_1	T	Unit Price CLJGJ L2~10	CLJGJ L10.5~20	CLJGJ L20.5~30	CLJGJ L30.5~40	CLJGJ L40.5~50	CLJGM L2~10	CLJGM L10.5~20	CLJGM L20.5~30	CLJGM L30.5~40	CLJGM L40.5~50
CLJGJ CLJGM	8	3	2~30	5	1				-	-				-	-
		4		6											
	10	3		5					-	-				-	-
		4		7											
		5		8											
	12	4		7					-	-				-	-
		5		8											
		6		9											
	14	4	5~40	7	1.5					-					-
		5		8											
		6		9											
		8		11											
	15	5		8						-					-
		6		9											
		8		11											
		10		13											
	16	5		8						-					-
		6		9											
		8		11											
		10		13											
	20	6	10~50	9	2										
		8		11											
		10		13											
		12		16											
	25	8		11											
		10		13											
		12		16											
		15		21											
		16		22											
	30	10		13											
		12		16											
		15		21											
		16		22											
		20		25											

Ordering Example

Part Number	-	V	-	L
CLJGJ15	-	8	-	20

Alterations

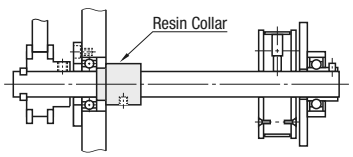
Part Number	-	V	-	L	-	(VKC, MC, WMC, TC)
CLJGM20	-	10	-	25	-	TC5

Alterations	I.D. Tolerance	Set Screw Hole (1-set 2-set)	T Dimension Change
			
Code	VKC	MC, WMC	TC
Spec.	Changes the I.D. tolerance to $^{+0.1}_{0}$. Ordering Code VKC D-V≥6	Adds a tapped hole (coarse thread) at D part. Ordering Code MC3 WMC5 For the condition of thickness (D-V)/2, see the table below. L≥MC, WMCx3 MC, WMC=Select from the table below.	Changes T dimension. Ordering Code TC3 Specifiable Range 0.5~10mm (Specify in 0.5mm increments.)

MC, WMC	(D-V)/2
3, 4	3 or More
5, 6, 8	5 or More
10, 12	8 or More

Example

For Bearing Inner Ring Retention



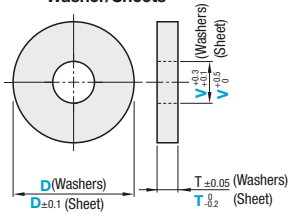
Ceramic Washers / Sheets / Collars



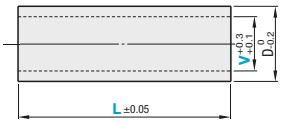
Type		Material	
Washer	SCERAW	Ceramic	Alumina 96
	CERAW		Alumina 92
Collar with Flange	CERAB		
Collar	CERAC		
Sheet	SWSCE	Ceramic Fiber	

* D dimensions for ceramics (CERAB) are fixed to V dimensions.

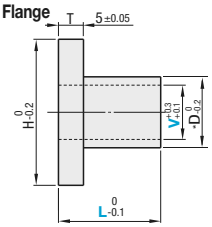
Washer/Sheets



Collar



Collar with Flange



Bushings for Locating Pins - Ceramics Type (1 -1686), Ceramics Rods (P.322), and Ceramics Circular Plates (P.991) are also available.

Washer (Alumina 92)

Part Number Type	D	V	T	Unit Price
CERAW	10	3	3	
	12	4		
	15	5		
	20	6		
	25	8		
	30	10		
	35	12	5	
	40	16		
	45	20		

Ordering Example: Part Number — CERAW10

Collar with Flange (Alumina 92)

Part Number Type	V	L Selection	H	D	Unit Price
CERAB	3	8 10 15	10	6	
	4		12	8	
	5		15	10	
	6		20	10	
	8	10 15 20	25	12	
	10		30	14	
	12	15 20 25	35	20	
	16		40	20	
	20		45	25	

Ordering Example: Part Number - L — CERAB6 - 10

Collar (Alumina 92)

Part Number Type	V	L 1mm Increment	D	Unit Price L5~29	L30~54	L55~79	L80~100
CERAC	3	5~50	6			-	-
	4		8				
	5		10				
	6		10				
	8		12				
	10		14				
	12	5~100	20				
	16		20				
	20		25				

Ordering Example: Part Number - L — CERAC16 - 55

Washer (Alumina 96)

Part Number Type	D	V Selection	T	Unit Price
SCERAW	10	3 4 5	3	
	12	4 5 6		
	15	5 6 8		
	20	6 8		

Ordering Example: Part Number - V — SCERAW10 - 5

Sheet (Ceramic Fiber)

Part Number Type	D	V Selection	T	Unit Price
SWSCE	8	3 4	1	
	10	4 5 6		
	12	4 5 6 8		
	15	5 6 8 10		
	20	6 8 10 12		
	25	8 10 12 15		
	30	8 10 12 15 20		

Ordering Example: Part Number - V - T — SWSCE10 - 4 - 1

Property Values of Alumina 92 / Alumina 96 / Ceramic Fiber (Reference: The data in the table are the values of materials.)

Properties \ Material Name		Alumina 92	Alumina 96	Ceramic Fiber
Dielectric Breakdown Parallel to Lamination	kV/mm	~10	10	-
Volume Resistance Force	Ω-cm	~10^{14}	~10^{14}	-
Bending Strength	kN/cm^2	24~34	33	-
Compression Strength	kN/cm^2	147~245	210	
Tensile Strength	MPa	1000~1200	1500	0.6
Expansion Coefficient	1/°C	8x10^{-6}	7.6x10^{-6}	-
Thermal Conductivity	cal/cm・sec・°C	3.6~5.0x10^{-2}	5.0x10^{-2}	1.7x10^{-4}
Heat Resistance	°C	1000~1200	1500	1300
Water Absorption Ratio	%	0	0	-
Specific Gravity	-	3.7	3.8	0.25
Main Material	-	Al_2O_3(92%)	Al_2O_3(96%)	-

These materials are fragile. Please handle with care.

Thermal Insulation Washers / Collars

This material excels in insulation resistance as well as heat insulation.

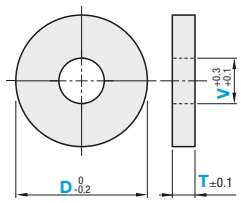


RoHS

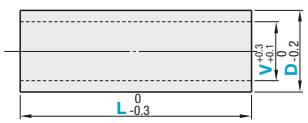
Type		Material
Washer	DJW	Thermal Insulation Material
Collar	DJC	
Collar with Flange	DJB	

The same material as for HIPLA on **P.1679** is used.

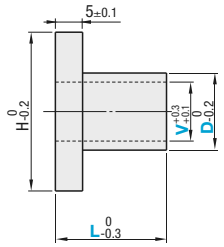
Washer



Collar



Collar with Flange



■Washer (Heat Insulation Material)

Part Number Type	D	V Selection	T Selection	Unit Price
DJW	10	3 4 5	3 5	
	12	4 5 6	3 5	
	16	5 6 8	3 5	
	20	5 6 8	3 5	
	25	5	5	
		6 8 10	3 5	

■Collar (Heat Insulation Material)

Part Number Type	D	V Selection	L	Unit Price L10	Unit Price L30
DJC	8	3 4 5	10 30		
	10	4 5 6			
	12	4 5 6 8			
	16	5 6 8			
	20	5 6 8 10			

■Collar with Flange (Heat Insulation Material)

Part Number Type	V	D Selection	L Selection	H	Unit Price L10	Unit Price L15	Unit Price L20
DJB	3	8	10	12		-	-
	4	8 10	10 15	14			-
	5	10 12	10 15 20	15			
	6	10 12	10 15 20	20			
	8	12	10 15 20	25			
	10	20	10 15 20	30			

Ordering Example

Part Number	-	V	-	T
DJW10	-	3	-	5

Part Number	-	V	-	L
DJC8	-	3	-	10

Part Number	-	D	-	L
DJB4	-	8	-	15

■Properties of Heat Insulation Material (Values shown below are for reference only.)

Mechanical Properties				Thermal and Electrical Characteristics		
Tensile Strength		MPa	108	Deflection Temperature under Load (1.82Mpa)	°C	400~
Elongation		%	0.7	Linear Expansion Coefficient	1/°C	2.6~3.5x10^{-5} *2
Bending Strength	Vertical	MPa	145~130 *1	Thermal Conductivity	W/m・K (cal/cm・sec・°C)	0.24 (5.7x10^{-4})
				Dielectric Constant (1MHz)	-	3.8
Flexural Modulus			17900	Dissipation Factor (1MHz)	-	0.005
Compression Strength	Vertical		439~410 *1	Volume Resistivity	Ω・cm	1.0x10^{14}
	Parallel		98 ~ 90 *1	Dielectric Breakdown Strength (Breakdown Voltage)	kV/mm	15
Izod Impact Strength (Notched)		J/cm	2.9	Arc Resistance	sec	345
Rockwell Hardness		R	R113	Moisture Absorption (At 23°Cx24h)	%	0.05
Glass Fiber Content		-	Available	Ambient Operating Temperature	°C	~400
Specific Gravity		-	2.0			

*1 Bending Strength maintains the minimum value even at 400 degrees Celsius.
*2 2.6 = ambient temperature ~ 200°C, 3.5 = ambient temperature ~ 400°C.

■About Direction of Material Lamination

Laminated directions of washer and collar are different (Figure below).
Therefore, mechanical strength varies depending on direction of the lamination.

- **Washers are laminated in the vertical direction.**



- **Collar and Collar with Flange are laminated in the radial direction. Please note that the mechanical strength is less than washer's.**



The above are reference images. Actual products may differ from the images.

Washers / Collars - Fluororesin / Epoxy Glass / PEEK

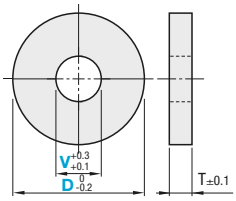


Washer	Collar	Collar with Flange	Material
EPOW	EPOC	EPOB	Epoxy Glass
PTW	PTC	PTB	Fluororesin (Polytetrafluoroethylene)
PKW	PKC	PKB	PEEK

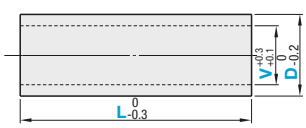
Material Properties P.141

6.3

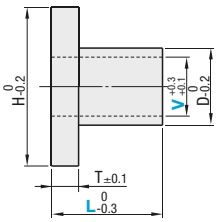
Washer



Collar



Collar with Flange



■Washer

Part Number Type	D	V Selection	T	Unit Price EPOW	PTW	PKW
EPOW PTW PKW	10	3 4 5 6	3			
	12	4 5 6 8				
	14	4 5 6 8 10				
	15	4 5 6 8 10				
	16	5 6 8 10				
	20	5 6 8 10 12				
	25	6 8 10 12				
	30	10 12 16				
	35	12 16	5			
	40	16				

Ordering Example: Part Number - V → PTW10 - 3

■Collar

Part Number Type	V	D Selection	L 1mm Increment
EPOC PTC PKC	2	5 6 8 10	5~30
	3	5 6 8 10 12 14	
	4	6 8 10 12 14 15	5~50
	5	8 10 12 14 15 16 20	
	6	8 10 12 14 15 16 20 25	
	8	12 14 15 16 20 25 30	
	10	14 15 16 20 25 30	
	12	20 25 30	5~100
	16	20 25 30	
	20	25 30	

Ordering Example: Part Number - D - L → EPOC16 - 25 - 55

Machining Conditions L≤Dx3, only for PTC

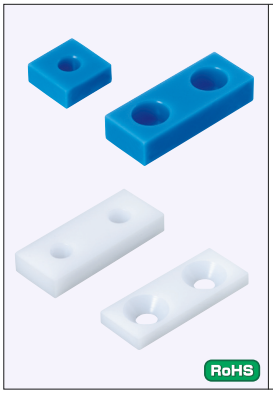
Part Number		Unit Price EPOC				PTC				PKC			
Type	V	L5~25	L26~50	L51~75	L76~100	L5~25	L26~50	L51~75	L76~100	L5~25	L26~50	L51~75	L76~100
EPOC PTC PKC	2			-	-			-	-			-	-
	3												
	4												
	5												
	6												
	8												
	10												
	12												
	16												
	20												

■Collar with Flange

Part Number Type	V	L Selection	H	D	T	Unit Price EPOB	PTB	PKB
EPOB PTB PKB	3	8 10 15 20	10	6	5			
	4		12	8				
	5		15	10				
	6		20	10				
	8	10 15 20 25	25	12				
	10		30	14				
	12	15 20 25	35	20				
	16		40	20				

Ordering Example: Part Number - L → PKB10 - 10

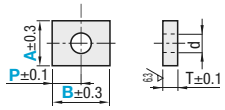
Square Resin Washers / Extra Thin Resin Sheets



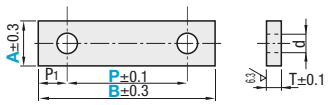
One Through Hole	Two Through Holes	Two Countersunk Holes	Two Counterbored Holes	Material	Color
WSRJJ	WSRRJ	WSRPJ	WSRZJ	Polyacetal	White
WSRJM	WSRRM	WSRPM	WSRZM	MC Nylon Standard Grade	Blue

Material Properties P.141

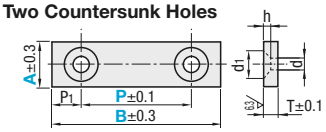
One Through Hole



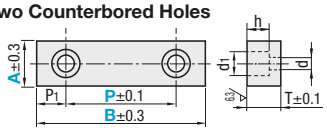
Two Through Holes



Two Countersunk Holes



Two Counterbored Holes



One Through Hole

Part Number Type	A	B 1mm Increment	P 0.5mm Increment (P≤B/2)	T	Screw Nominal Dia.	d	Unit Price WSRJJ	Unit Price WSRJM
WSRJJ WSRJM	6	6~20	3.0~10.0	2	3	3.5		
	8	8~25	4.0~12.5	3	3	3.5		
	10	10~30	5.0~15.0	4	4	4.5		
	12	12~35	6.0~17.5	5	4	4.5		
	15	15~45	7.5~22.5	6	5	5.5		
	20	20~60	10.0~30.0	8	6	6.5		
	25	25~75	12.5~37.5	10	8	9		

Two Through Holes

Part Number Type	A	B 1mm Increment	P 0.5mm Increment (P≤B-2P1)	T	Screw Nominal Dia.	d	P1	Unit Price WSRRJ	Unit Price WSRRM
WSRRJ WSRRM	6	12~24	6.0~18.0	2	3	3.5	3		
	8	16~32	8.0~24.0	3	3	3.5	4		
	10	20~40	10.0~30.0	4	4	4.5	5		
	12	24~48	12.0~36.0	5	4	4.5	6		
	15	30~60	15.0~45.0	6	5	5.5	7.5		
	20	40~80	20.0~60.0	8	6	6.5	10		
	25	50~100	25.0~75.0	10	8	9	12.5		

Two Countersunk Holes

Part Number Type	A	B 1mm Increment	P 0.5mm Increment (P≤B-2P1)	T	Screw Nominal Dia.	d	d1	h	P1	Unit Price WSRPJ	Unit Price WSRPM
WSRPJ WSRPM	10	20~40	10.0~30.0	3	3	3.5	7.5	2	5		
	12	24~48	12.0~36.0	4	4	4.5	9.5	2.5	6		
	15	30~60	15.0~45.0	4	5	5.5	11.5	3	7.5		
	20	40~80	20.0~60.0	5	6	6.5	13.5	3.5	10		
	25	50~100	25.0~75.0	6	8	9	19	5	12.5		

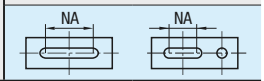
Two Counterbored Holes

Part Number Type	A	B 1mm Increment	P 0.5mm Increment (P≤B-2P1)	T	Screw Nominal Dia.	d	d1	h	P1	Unit Price WSRZJ	Unit Price WSRZM
WSRZJ WSRZM	10	20~40	10.0~30.0	6	3	3.5	6.5	4	5		
	12	24~48	12.0~36.0	8	4	4.5	8	5	6		
	15	30~60	15.0~45.0	8	5	5.5	9.5	6	7.5		
	20	40~80	20.0~60.0	10	6	6.5	11	7	10		
	25	50~100	25.0~75.0	12	8	9	14	9	12.5		

Ordering Example: Part Number - B - P
WSRJJ10 - 25 - 12.5

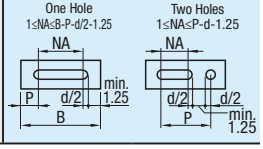
Alterations: Part Number - B - P - (NA)
WSRJM20 - 60 - 15.0 - NA30

Alterations — Slotted Hole



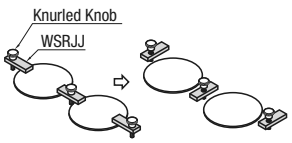
Code: NA

Spec.: Changes the through hole to the slotted hole. (Applicable to One Through Hole and Two Through Holes Type only.)
Ordering Code (Specify in 0.5mm increments.) NA15
Machining Conditions



Example

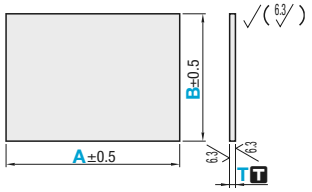
Workpiece Holder



Extra Thin Resin Sheets

Polyacetal, Fluororesin, Polycarbonate

Type Sheet	Material	Color	Thickness (T) Tolerance 0.1	0.2	0.3	0.5	1
CIRAJ	Polyacetal	White	-	±0.03	±0.04	±0.07	±0.10
CIRAT	Fluororesin	White	±0.01	±0.02	±0.03	±0.05	
CIRAP	Polycarbonate	Transparent					



Ordering Example: Part Number - A - B
CIRAJ0.2 - 100 - 20

Part Number Type	T	A	B	Unit Price CIRAJ T0.2	CIRAJ 0.3	CIRAJ 0.5	CIRAJ 1.0	CIRAT T0.1, 0.2	CIRAT 0.3	CIRAT 0.5	CIRAT 1.0	CIRAP T0.1, 0.2	CIRAP 0.3	CIRAP 0.5	CIRAP 1.0
CIRAJ CIRAT CIRAP	*0.1	20, 30	20												
	0.2	40, 50													
	0.3	60, 70, 80													
	0.5	90, 100													
	1.0	150													
		30, 40	30												
		50, 60													
		70, 80, 90													
		100, 150													
		40, 50	40												
		60, 70, 80													
		90, 100													
		150													
		50, 60	50												
		70, 80, 90													
		100													
		150, 200													
		60, 100	60												
		200													
		100	100												
		200													

* CIRAJ is not available for T0.1.

Shim Ring Packages / Shim Rings

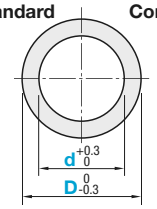
Standard / Configurable

■Standard, Sold by the package (30 pcs.) / Configurable

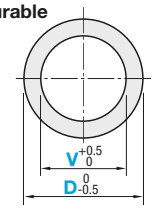


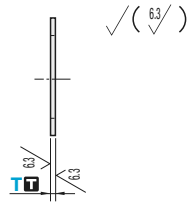
Standard	Configurable	Material	Hardness	Thickness (T) Tolerance							
				0.01	0.05	0.1	0.2	0.3	0.5	0.8	1.0
PCIMRS	CIMRSF	EN 1.4301 Equiv.	370~430HV	±0.003	±0.005	±0.02	±0.03	±0.035	±0.04		±0.05
PCIMRB	CIMRBF	Brass (EN CW505L Equiv. or EN CW507L Equiv.)	-	-	±0.005	±0.02	±0.03	±0.04	±0.05	-	±0.08
PCIMR	CIMRF	EN 1.0330 Equiv.	-	-	-	±0.03		±0.04	±0.06	-	±0.11

Standard



Configurable





■EN 1.4301 Equiv. (?)30 pcs. per Package

(?) No specification available for plate thickness (T) without value.

Part Number Type	d	D Selection	T Selection	Unit Price PCIMRS T0.01, 0.05	T0.1~0.3	T0.5	T1.0
PCIMRS	2	3 4 5 6	0.01 0.05 0.1 0.2 0.3 0.5 1.0			-	-
	3	4 5 6 7 8 9 10				-	-
	4	5 6 7 8 9 10 12 13				-	-
	5	7 8 9 10 12 13 14 15 16					
	6	8 9 10 12 13 14 15 16 18					
	8	10 12 13 14 15 16 18 20					
	10	12 13 14 15 16 18 20					
	12	15 16 18 20 21 22					
	15	18 20 21 22 24					
	16	20 21 22 24 28					
	17	20 21 22 24 28 30 32					
	20	24 28 30 32 35 40					
	22	28 30 32					
	25	30 32 35 40 42					
	30	35 40 42 45 50					
	35	42 45 50 55					
	40	45 50 55					
	45	50 55					

■Brass, EN 1.0330 Equiv. (?)30 pcs. per Package

Part Number Type	d	D Selection	T Selection	Unit Price PCIMRB T0.05	T0.1~0.3	T0.5	T1.0	PCIMR T0.1~0.3	T0.5	T1.0
PCIMRB PCIMR	3	5 6 8 10	(0.05) For PCIMRB only. 0.1 0.2 0.3 0.5 1.0							
	4	6 8 10 12								
	5	8 10 12 14								
	6	10 12 14 16								
	8	12 14 16								
	10	14 16 18 20								
	12	16 18 20 21 22								

■Configurable

Part Number	D Selection 0.5mm Increment	V V2.6 or Less Selection V3.0 or More, 0.5mm Increments	T Selection	Unit Price CIMRSF T0.05	T0.1~0.3	T0.5	T0.8, T1.0	CIMRBF T0.05	T0.1~0.3	T0.5	T1.0	CIMRF T0.1~0.3	T0.5	T1.0
CIMRSF CIMRBF CIMRF	4.0~ 20													
	20.5~ 40		(0.05) CIMRBF, For CIMRSF only											
	40.5~ 60	0												
	60.5~ 80	(No Hole)												
	80.5~100	2.0	(0.8) For CIMRSF only											
	100.5~120	2.6												
	120.5~140													
	140.5~160		0.1											
	160.5~180	3.0~248.0	0.2											
	180.5~200	T≤0.2⋯› V≤D-2	0.3											
	200.5~214	0.3≤T⋯› V≤D-3	0.5											
	214.5~230	(V2.6⋯› D≥5)	1.0											
	230.5~250													

Ordering Example

Part Number - D - T
PCIMRS5 - 12 - 0.1

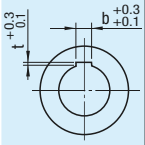
Part Number - D - V - T
CIMRF - D73 - V43 - T1.0

Alterations

Part Number - D - V - T - (KC)
CIMRSF - D22 - V18 - T0.1 - KC

(?)Applicable to Dimension Configurable Type only.

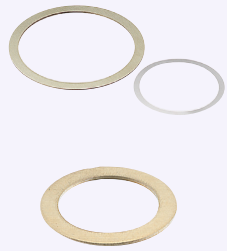
Alteration	Code	Spec.
Keyway Relief	KC	Adds an keyway relief. Ordering Code KC Machining Conditions (?)8≤V≤49.5



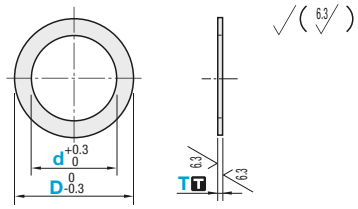
V	b	t	D-V
8~10.5	3	2.0	7 or More
11~12.5	4	2.5	8 or More
13~17.5	5	3.0	10 or More
18~22.5	6	3.5	12 or More
23~30.5	8	4.0	14 or More
31~38.5	10	4.0	14 or More
39~42.5	12	4.0	14 or More
43~49.5	14	4.5	16 or More

Shim Rings
Standard

■Standard



Standard	Material	Hardness	Thickness (T) Tolerance								
			0.01	0.02	0.03	0.05	0.1	0.2	0.3	0.5	1.0
CIMRS	EN 1.4301 Equiv.	370~430HV	±0.003		±0.005		±0.02	±0.03	±0.035	±0.04	±0.05
CIMRB	Brass (EN CW505L Equiv. or EN CW507L Equiv.)	-	-	-	-	±0.005	±0.02	±0.03	±0.04	±0.05	±0.08
CIMR	EN 1.0330 Equiv.	-	-	-	-	-	±0.03		±0.04	±0.06	±0.11



■EN 1.4301 Equiv.

No specification available for plate thickness (T) without value.

Part Number		D Selection	T Selection	Unit Price CIMRS				
Type	d			T0.01, 0.05	T0.02, 0.03	T0.1~0.3	T0.5	T1.0
CIMRS	2	3 4 5 6	0.01 0.02 0.03 0.05 0.1 0.2 0.3 0.5 1.0				-	-
	3	4 5 6 7 8 9 10					-	-
	4	5 6 7 8 9 10 12 13					-	-
	5	7 8 9 10 12 13 14 15 16						
	6	8 9 10 12 13 14 15 16 18						
	8	10 12 13 14 15 16 18 20						
	10	12 13 14 15 16 18 20						
	12	15 16 18 20 21 22						
	15	18 20 21 22 24						
	16	20 21 22 24 28						
	17	20 21 22 24 28 30 32						
	20	24 28 30 32 35 40						
	22	28 30 32 35 40						
	25	30 32 35 40 42						
	28	32 35 40 42 45						
	30	35 40 42 45 50						
	35	42 45 50 55						
	40	45 50 55						
	45	50 55						

■Brass, EN 1.0330 Equiv.

Part Number		D Selection	T Selection	Unit Price CIMRB				CIMR		
Type	d			T0.05	T0.1~0.3	T0.5	T1.0	T0.1~0.3	T0.5	T1.0
CIMRB CIMR	2	4 5 6	(0.05) For CIMRB only 0.1 0.2 0.3 0.5 1.0							
	3	5 6 7 8 10								
	4	6 7 8 10 12								
	5	7 8 10 12 14 16								
	6	8 10 12 14 16								
	8	12 14 16 18 20								
	10	12 14 16 18 20								
	12	16 18 20 21 22								
	15	18 20 21 22 24								
	16	20 21 22 24 28								
	17	20 21 22 24 28 30 32								
	20	24 28 30 32 35 40								
	22	28 30 32 35 40								
	25	30 32 35 40 42								
	28	32 35 40 42 45								
	30	35 40 42 45 50								
	35	42 45 50 55								
	40	45 50 55								
	45	50 55								

Ordering Example: Part Number - D - T
CIMRS5 - 12 - 0.1

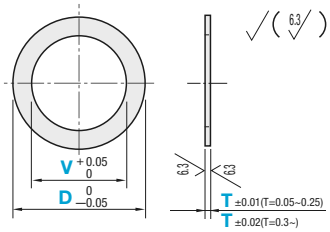
Precision Grade Shim Rings / Wave Washers

Standard / Configurable

■Precision Grade Shim Rings



RoHS



Standard, Sold by the package	Configurable	Material	Hardness
PCIMAS	CIMASF	EN 1.4301 Equiv.	370~430HV
PCIMAK	CIMAKF	SK	480~520HV

■Standard, Sold by the package

1 package contains 10 pieces.

Part Number Type	D	V (I.D.) Selection	T Selection	Unit Price T0.05	Unit Price T0.1~0.3	Unit Price T0.5, 1.0
PCIMAS PCIMAK	5	3	0.05 0.1 0.2 0.3 0.5 1.0			
	6	3 4				
	7	3 4 5				
	8	4 5 6				
	9	4 5 6				
	10	4 5 6 7 8				
	11	5 6 7 8				
	12	5 6 7 8				
	13	7 8				
	14	7 8 10				
	15	8 10 12				
	16	8 10 12				
	20	8 10 12				
	22	8 10 12				
	25	8 10 12 18 21				
	28	21 23				
	30	24				

Ordering Example

Part Number	-	D	-	V	-	T
PCIMAS	-	D25	-	V10	-	T0.2
CIMASF	-	D25	-	V10	-	T0.2

■Configurable

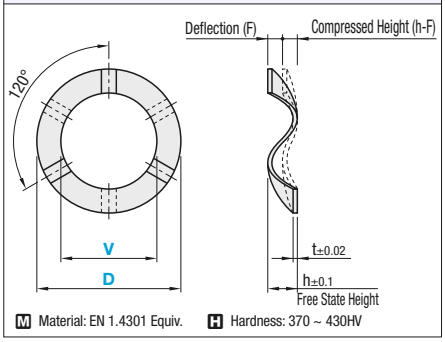
Part Number	D	V	T Selection CIMASF	T Selection CIMAKF	Unit Price T0.05~0.3	Unit Price T0.4~1.0
	0.5mm Increment					
CIMASF (EN 1.4301 Equiv.) CIMAKF (SK)	5~10	0 (No Hole) 2.0 2.6 3.0~48.0	0.05 0.06 0.07 0.08 0.09 0.1 0.15 0.2 0.25 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0	0.05 0.1 0.2 0.3 0.5 1.0		
	10.5~20					
	20.5~30					
	30.5~40					
	40.5~50					

T≤0.25···V≤D-2 0.3≤T···V≤D-4

■Wave Washers



RoHS



M Material: EN 1.4301 Equiv. H Hardness: 370 ~ 430HV

■Standard, Sold by the package

1 Package contains 30 pieces.

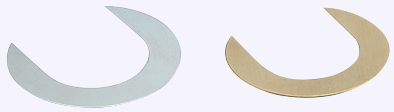
Part Number Type	V I.D.	V Tolerance	D O.D.	D Tolerance	t Thickness	h Free Position	Load (Reference Value) Deflection F (mm)	Load (Reference Value) h-F	Load (N)	Deflection F (mm)	Load (Reference Value) h-F	Load (N)	Unit Price
PACK-WVWS	3	+0.2 0	3.6	0 -0.2	0.05	0.5	0.1	0.4	0.35	0.3	0.2	0.77	
			4.2						0.73			1.96	
	4	+0.3 0	5	0 -0.3		0.7	0.2	0.5	0.47	0.4	0.3	0.91	
			6						0.87			1.62	
	5		7						0.60			1.11	
			8						0.69			1.25	
			10						0.75			1.42	
	6		8		0.1	1.0	0.3	0.7	3.68	0.7	0.3	8.39	
			10						5.23			15.33	
			12						5.10			19.00	
	8		10						1.88			4.93	
			12						2.93			8.72	
			16						2.84			11.00	
	10		12						1.03			2.71	
			14						1.31			4.46	
			16						1.76			5.82	
	12		14						0.69			1.71	
			15						0.98			2.58	
			17						1.20			3.58	
	16	+0.5 0	18	0 -0.5	0.15	1.5	0.5	1.0	1.33	1.0	0.5	2.82	
			20						2.56			5.95	
			28						4.28			12.61	
	20		24						1.43			3.31	
			28						2.34			5.94	
	22		28						1.48			3.76	
			30						1.74			4.59	
	25	+0.9 0	30	0 -0.9	0.2	3.0	1.0	2.0	5.40	2.0	1.0	8.78	
			35						8.20			16.25	
	30		35						2.92			5.77	
			38						4.30			9.29	

Ordering Example

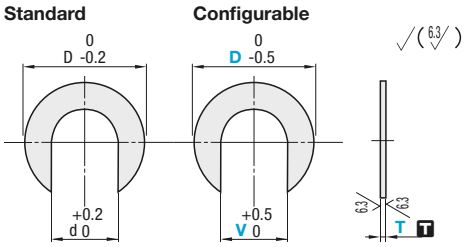
Part Number	-	V	-	D
PACK-WVWS	-	V3	-	D4.2

Shim (Split Type)
Standard / Configurable

■ Split Type



RoHS



Part Number		Material	Hardness	Thickness (T) Tolerance					
Standard	Configurable			0.05	0.1	0.2	0.3	0.5	1.0
CIMW	CIMWF	EN 1.0330 Equiv.	-	-	±0.03		±0.04	±0.06	±0.11
CIMWB	CIMWBF	Brass (EN CW505L Equiv. or EN CW507L Equiv.)	-	±0.005	±0.02	±0.03	±0.04	±0.05	±0.08
CIMWS	CIMWSF	EN 1.4301 Equiv.	370~430HV	±0.005	±0.02	±0.03	±0.035	±0.04	±0.05
PACK-CIMWS	-								

■ Standard

Part Number		T	d	D	Unit Price		
Type	No.				CIMW	CIMWB	CIMWS
CIMW CIMWB CIMWS	6	(0.05)	6.5	12			
	8	For CIMWB and	8.5	15			
	10	CIMWS only	10.5	20			
	12	0.1	13	25			
	16	0.2	17	30			
	20	0.3	21	35			
	24	0.5	25	40			
	30	1.0	31	50			

Ordering Example: Part Number - T
CIMW10 - 0.2

■ Standard, Sold by the package (1 package contains 10 pieces.)

Part Number		T	d	D	Unit Price			
Type	No.	Selection			T0.05	T0.1~0.3	T0.5	T1.0
PACK-CIMWS	6		6.5	12				
	8	0.05	8.5	15				
	10	0.1	10.5	20				
	12	0.2	13	25				
	16	0.3	17	30				
	20	0.5	21	35				
	24	1.0	25	40				
	30		31	50				

Ordering Example: Part Number - T
PACK-CIMWS12 - 0.1

Please specify number of packages to order.
Quantity 1 means one package.

■ Configurable

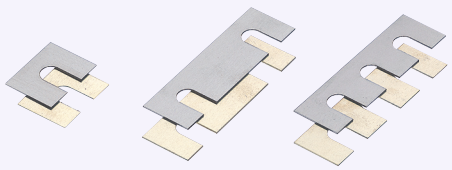
Part Number	T Selection	V 0.5mm Increment	D 1mm Increment	Unit Price											
				CIMWF			CIMWBF				CIMWSF				
				T0.1~0.3	T0.5	T1.0	T0.05	T0.1~0.3	T0.5	T1.0	T0.05	T0.1~0.3	T0.5	T1.0
CIMWF CIMWBF CIMWSF	(0.05) For CIMWBF and CIMWSF only 0.1 0.2 0.3 0.5 1.0	3~31	10~20											
			21~50											

V≤D-4

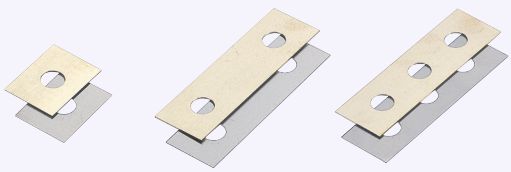
Ordering Example: Part Number - T - V - D
CIMWF - 0.2 - 8.5 - 20

Square Shims
Slotted Hole / Round Hole

■ Slotted



■ Round Hole

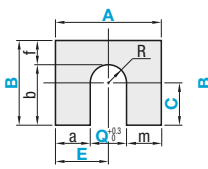


RoHS

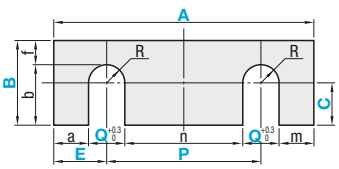
Part Number			Material	Hardness	Thickness (T) Tolerance							
One Slot	Two Slots	Three Slots			0.05	0.1	0.2	0.3	0.5	1.0	2.0	3.0
ASAFR	ASFFR	ASCFR	EN 1.0330 Equiv.	-	-	±0.03		±0.04	±0.06	±0.11	±0.17	-
ASAFB	ASFFB	ASCFB	Brass (EN CW505L Equiv. or EN CW507L Equiv.)	-	±0.005	±0.02	±0.03	±0.04	±0.05	±0.08	±0.12	±0.15
ASAFS	ASFFS	ASCFS	T=0.05~1.0 EN 1.4301 Equiv. T=2.0, 3.0 EN 1.4301 Equiv.	370~430HV -	±0.005	±0.02	±0.03	±0.035	±0.04	±0.05	±0.20	±0.25

Machining Conditions of Slotted Hole Type
- f≥3
- a≥3
- m≥3
- n≥3

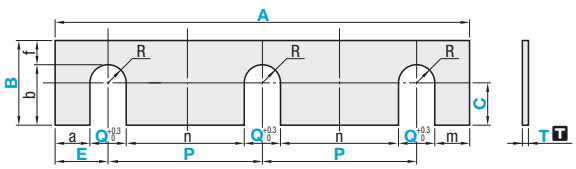
One Slot



Two Slots



Three Slots



Part Number Type				1mm Increment A	1mm Increment B	Selection T	0.1mm Increment Q	0.1mm Increment E	0.1mm Increment C	0.1mm Increment P
	EN 1.0330 Equiv.	Brass	EN 1.4301 Equiv.(H)							
One Hole	ASAFR	ASAFB	ASAFS	10~150	10~150	(0.05) 0.1 0.2 0.3 0.5 1.0 2.0 (3.0)	3~31	Q/2+3~	0 ~ B-(Q/2+3)	For One Hole Type, specification is not necessary.
Two Holes	ASFFR	ASFFB	ASFFS	16~200	10~200					Q+3~
Three Holes	ASCFR	ASCFB	ASCFS							

EN 1.0330 Equiv. is not available for T(0.05) and T(3.0).

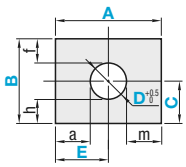
Ordering Example

Part Number	-	A	-	B	-	T	-	Q	-	E	-	C	-	P
ASFFB	-	A100	-	B25	-	T1.0	-	Q12	-	E15	-	C12	-	P70

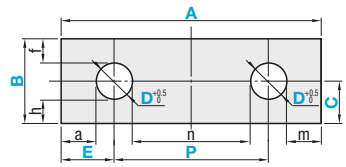
Part Number			Material	Hardness	Thickness (T) Tolerance							
One Round Hole	Two Round Holes	Three Round Holes			0.05	0.1	0.2	0.3	0.5	1.0	2.0	3.0
ASACR	ASFCR	ASCCR	EN 1.0330 Equiv.	-	-	±0.03		±0.04	±0.06	±0.11	±0.17	-
ASACB	ASFCB	ASCCB	Brass (EN CW505L Equiv. or EN CW507L Equiv.)	-	±0.005	±0.02	±0.03	±0.04	±0.05	±0.08	±0.12	±0.15
ASACS	ASFCS	ASCCS	T=0.05~1.0 EN 1.4301 Equiv. T=2.0, 3.0 EN 1.4301 Equiv.	370~430HV -	±0.005	±0.02	±0.03	±0.035	±0.04	±0.05	±0.20	±0.25

Machining Conditions of Round Hole Type
- f ≥2
- a≥2
- m≥2
- n≥2
- h≥2

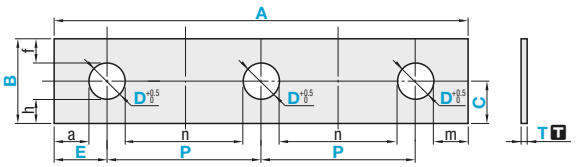
One Round Hole



Two Round Holes



Three Round Holes



Part Number Type				1mm Increment A	1mm Increment B	Selection T	0.1mm Increment D	0.1mm Increment E	0.1mm Increment C	0.1mm Increment P
	EN 1.0330 Equiv.	Brass	EN 1.4301 Equiv.(H)							
One Hole	ASACR	ASACB	ASACS	10~150	10~150	(0.05) 0.1 0.2 0.3 0.5 1.0 2.0 (3.0)	3~100	D/2+2~	D/2+2 ~ B-(D/2+2)	For One Hole Type, specification is not necessary.
Two Holes	ASFCR	ASFCB	ASFCS	15~200	10~200					D+2~
Three Holes	ASCCR	ASCCB	ASCCS							

EN 1.0330 Equiv. is not available for T(0.05) and T(3.0).

Ordering Example

Part Number	-	A	-	B	-	T	-	D	-	E	-	C	-	P
ASACR	-	A50	-	B25	-	T0.1	-	D7.5	-	E25	-	C11		
ASCCS	-	A120	-	B15	-	T3.0	-	D10	-	E15	-	C7	-	P45

One Slot / One Round Hole

A	B	Unit Price										
		ASAFR, ASACR			ASAFB, ASACB				ASAFS, ASACS			
		T0.1~0.5	T1.0	T2.0	T0.05	T0.1~0.5	T1.0	T2.0~3.0	T0.05	T0.1~0.5	T1.0	T2.0~3.0
10~50	10~ 50											
	51~100											
	101~150											
51~70	10~ 50											
	51~100											
	101~150											
71~100	10~ 50											
	51~100											
	101~150											
101~130	10~ 50											
	51~100											
	101~150											
131~150	10~ 50											
	51~100											
	101~150											

Two Slots / Two Round Holes

A	B	Unit Price										
		ASFFR, ASFCR			ASFFB, ASFCB				ASFFS, ASFCS			
		T0.1~0.5	T1.0	T2.0	T0.05	T0.1~0.5	T1.0	T2.0~3.0	T0.05	T0.1~0.5	T1.0	T2.0~3.0
15~ 50	10~ 50											
	51~100											
	101~150											
51~ 70	10~ 50											
	51~100											
	101~150											
71~100	10~ 50											
	51~100											
	101~150											
101~130	10~ 50											
	51~100											
	101~150											
131~150	10~ 50											
	51~100											
	101~150											
151~200	10~ 50											
	51~100											
	101~150											
	151~200											

Three Slots / Three Round Holes

A	B	Unit Price										
		ASCFR, ASCCR			ASCFB, ASCCB				ASCFS, ASCCS			
		T0.1~0.5	T1.0	T2.0	T0.05	T0.1~0.5	T1.0	T2.0~3.0	T0.05	T0.1~0.5	T1.0	T2.0~3.0
15~ 50	10~ 50											
	51~100											
	101~150											
51~ 70	10~ 50											
	51~100											
	101~150											
71~100	10~ 50											
	51~100											
	101~150											
101~130	10~ 50											
	51~100											
	101~150											
131~150	10~ 50											
	51~100											
	101~150											
151~200	10~ 50											
	51~100											
	101~150											
	151~200											

Square Shims

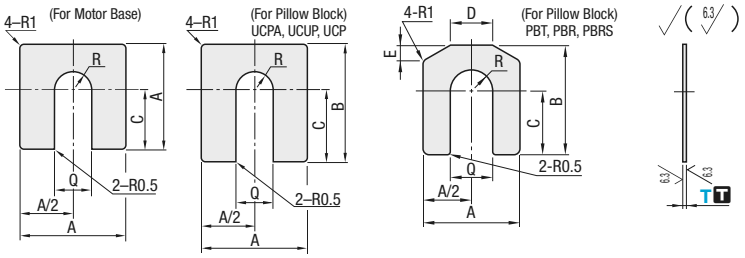
For Motor Base / For Pillow Block

■ For Motor Base
■ For Pillow Block



RoHS

Type		Material	Hardness	Thickness (T) Tolerance				
For Motor Base	For Pillow Block			0.05	0.1	0.2	0.5	1.0
CIMMS	CIMSS	EN 1.4301 Equiv.	370~430HV	±0.005	±0.02	±0.03	±0.04	±0.05
CIMMB	CIMSB	Brass (EN CW505L Equiv. or EN CW507L Equiv.)	-	±0.005	±0.02	±0.03	±0.05	±0.08
CIMM	CIMSN	EN 1.0330 Equiv.	-	-	±0.03	±0.03	±0.06	±0.11



■ For Motor Base

Part Number		T Selection	A	C	Q	Unit Price													
Type	No.					CIMMS					CIMMB					CIMM			
						T0.05	T0.1	T0.2	T0.5	T1.0	T0.05	T0.1	T0.2	T0.5	T1.0	T0.1	T0.2	T0.5	T1.0
CIMMS CIMMB CIMM	1035	(0.05) For CIMMB and CIMMS only 0.1 0.2 0.5 1.0	10	5	3.5				-	-	-	-	-	-	-	-	-	-	-
	1245		12	6	4.5				-	-	-	-	-	-	-	-	-	-	-
	1455		14	7	5.5				-	-	-	-	-	-	-	-	-	-	-
	1665		16	8	6.5				-	-	-	-	-	-	-	-	-	-	-
	2009		20	10	9														
	3013		30	15	13														
	4312		43	22	12														
	4814		48	24	14														
	5314		53	27	14														
	6816		68	34	16														
	8320		83	42	20														
	9825		98	49	25														
	11830		118	54	30														
	20036		200	100	36														

■ For Pillow Block

Part Number		T Selection	A	B	C	Q	D	E	Applicable Pillow Block	Unit Price													
Type	No.									CIMSS					CIMSB					CIMSN			
										T0.05	T0.1	T0.2	T0.5	T1.0	T0.05	T0.1	T0.2	T0.5	T1.0	T0.1	T0.2	T0.5	T1.0
CIMSS CIMSB CIMSN	10	(0.05) For CIMSS and CIMSB only 0.1 0.2 0.5 1.0	16	17.5	10.5	7	7	2	PBT10, PBR10, PBRS10						-	-	-	-	-	-	-	-	-
	12		16	18	10.5	7	7	2.5	PBT12, PBR12, PBRS12						-	-	-	-	-	-	-	-	-
	15		16	20	11.5	7	7	2.5	PBT15, PBR15, PBRS15						-	-	-	-	-	-	-	-	-
	17		18	21	12	7	8	2.5	PBT17, PBR17, PBRS17						-	-	-	-	-	-	-	-	-
	20		20	24.5	14.5	10	10	3	PBT20, PBR20, PBRS20						-	-	-	-	-	-	-	-	-
	25		20	27.5	16.5	10	10	3	PBT25, PBR25, PBRS25						-	-	-	-	-	-	-	-	-
	30		26	33	20	13	13	4	PBT30, PBR30, PBRS30						-	-	-	-	-	-	-	-	-
	204A		40	27	15	13	-	-	UCPA204 UCUP204														
	205A		45	30	16	13	-	-	UCPA205 UCUP205														
	206A		50	36	22	17	-	-	UCPA206 UCUP206														
	207A		55	41	26	17	-	-	UCPA207 UCUP207														
	208A		58	41	25	17	-	-	UCPA208 UCUP208														
	204		38	42	26	13	-	-	UCP-204														
	205		38	42	25	13	-	-	UCP-205														
	206		48	54	32	17	-	-	UCP-206														
	207		48	54	34	17	-	-	UCP-207														
	208		54	58	35	17	-	-	UCP-208														
	209		54	60	38	17	-	-	UCP-209														
	210		60	65	42	20	-	-	UCP-210														

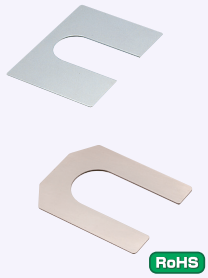
Ordering Example

Part Number	-	T
CIMM2009	-	0.5
CIMSN204A	-	0.1

Square Shim Package / Square Shims (Adjustment)

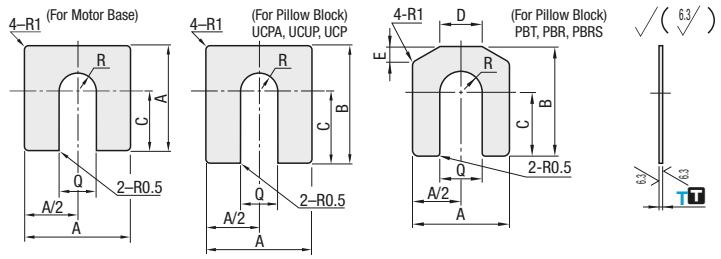
For Motor Base / For Pillow Block

■ Sold by the package
(1 pack=10 pcs.)



RoHS

Type		M Material	H Hardness	T Thickness (T) Tolerance				
For Motor Base	For Pillow Block			0.05	0.1	0.2	0.5	1.0
PACK-CIMMS	PACK-CIMSS	EN 1.4301 Equiv.	370~430HV	±0.005	±0.02	±0.03	±0.04	±0.05



■ For Motor Base / For Pillow Block Sold by the package (1 package contains 10 pieces.

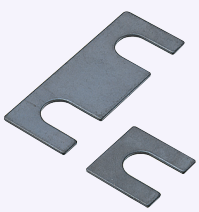
Part Number Type	No.	T Selection	A	B	C	Q	D	E	Unit Price T0.05	T0.1	T0.2	T0.5	T1.0
For Motor Base (EN 1.4301 Equiv.) PACK-CIMMS	1035		10	-	5	3.5	-	-				-	-
	1245		12	-	6	4.5	-	-				-	-
	1455		14	-	7	5.5	-	-				-	-
	1665		16	-	8	6.5	-	-				-	-
	2009		20	-	10	9	-	-					
	3013		30	-	15	13	-	-					
	4312		43	-	22	12	-	-					
	4814		48	-	24	14	-	-					
	5314		53	-	27	14	-	-					
	6816		68	-	34	16	-	-					
	8320		83	-	42	20	-	-					
	9825		98	-	49	25	-	-					
For Pillow Block (EN 1.4301 Equiv.) PACK-CIMSS	10	0.05 0.1 0.2 0.5 1.0	16	17.5	10.5	7	7	2					
	12		16	18	10.5	7	7	2.5					
	15		16	20	11.5	7	7	2.5					
	17		18	21	12	7	8	2.5					
	20		20	24.5	14.5	10	10	3					
	25		20	27.5	16.5	10	10	3					
	30		26	33	20	13	13	4					
	204A		40	27	15	13	-	-					
	205A		45	30	16	13	-	-					
	206A		50	36	22	17	-	-					
	207A		55	41	26	17	-	-					
	208A		58	41	25	17	-	-					
	204		38	42	26	13	-	-					
	205		38	42	25	13	-	-					
	206		48	54	32	17	-	-					
	207		48	54	34	17	-	-					
	208		54	58	35	17	-	-					
	209		54	60	38	17	-	-					
	210		60	65	42	20	-	-					

Ordering Example

Part Number	-	T
PACK-CIMMS2009	-	0.5
PACK-CIMSS204A	-	0.1

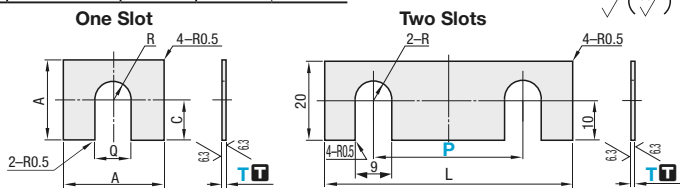
Please specify number of packages to order.
Quantity 1 means one package.

■ Adjustment Type



RoHS

Type One Slot	Type Two Slots	M Material	S Surface Treatment	H Hardness	T Thickness (T) Tolerance 0.5	1.0
ASA	ASF	EN 1.0330 Equiv.	Black Oxide	-	±0.05	±0.1
ASAS	-	EN 1.4301 Equiv.	-	370~430HV		



Part Number Type	T	No.	A	C	Q	ASA T0.5 Unit Price 1 ~ 49 pc(s).	ASA T0.5 Volume Discount Rate 50~100	ASA T1.0 Unit Price 1 ~ 49 pc(s).	ASA T1.0 Volume Discount Rate 50~100	ASAS T0.5 Unit Price 1 ~ 49 pc(s).	ASAS T0.5 Volume Discount Rate 50~100	ASAS T1.0 Unit Price 1 ~ 49 pc(s).	ASAS T1.0 Volume Discount Rate 50~100
ASA ASAS	0.5 1.0	1035	10	5	3.5								
		1245	12	6	4.5								
		1455	14	7	5.5								
		1665	16	8	6.5								
		2009	20	10	9								

For orders larger than indicated quantity, please check with WOS.

Part Number Type	T	P	L	Unit Price 1 ~ 49 pc(s).	Volume Discount Rate 50~100
ASF	0.5	30	50		
		40	60		
		50	70		
	1.0	30	50		
		40	60		
		50	70		

For orders larger than indicated quantity, please check with WOS.

Ordering Example

Part Number	-	No.
ASA0.5	-	1035

Part Number	-	P
ASF0.5	-	30

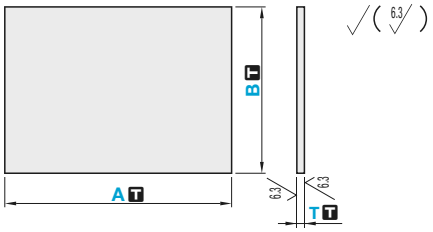
Shim Plates
Standard / Configurable

■ Shim Plates



RoHS

Type		Material	Hardness	Thickness (T) Tolerance					
Standard Type	Configurable			0.05	0.1	0.2	0.3	0.5	1.0
CIRA	CIRAF	EN 1.0330 Equiv.	-	-	±0.03		±0.04	±0.06	±0.11
CIRAB	CIRABF	Brass (EN CW505L Equiv. or EN CW507L Equiv.)	-	±0.005	±0.02	±0.03	±0.04	±0.05	±0.08
CIRAS	CIRASF	EN 1.4301 Equiv.	370~430HV	±0.005	±0.02	±0.03	±0.035	±0.04	±0.05



A, B	T A/B Tolerances		
	Standard Type		Configurable
	CIRA, CIRAS	CIRAB	
20~	+0.5 0		±0.5
400~	-	-	±0.8
800~	±1.2	+5 0	±1.2

■ Standard

Part Number		Selection		Unit Price																	
				CIRA					CIRAB						CIRAS						
Type	T	A	B	0.1	0.2	0.3	0.5	1.0	0.05	0.1	0.2	0.3	0.5	1.0	0.05	0.1	0.2	0.3	0.5	1.0
CIRA CIRAB CIRAS	(0.05) CIRA is not available. 0.1 0.2 0.3 0.5 1.0	20 30 40	20																		
		50 60 70	30																		
		80 90 100																			
		120 150																			
		40 50 60	40																		
		70 80 90																			
		100 120	50																		
		60 70 80																			
		90 100	60																		
		120 150	70																		
		200																			
		80 90 100	80																		
		120 150	90																		
		200																			
		100 120	100																		
		150	120																		
		200																			
		150	150																		
		200																			
		200	200																		
		1000	300	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-
			320						-	-	-	-	-	-							
		1200	365	-	-	-	-	-	-						-	-	-	-	-	-	

Specify as A≥B. No specification available for those without value.

■ Configurable

Part Number	1mm Increment		Selection	Unit Price								
				CIRAF			CIRABF			CIRASF		
	A	B	T	T0.1~0.3	T0.5	T1.0	T0.05~0.3	T0.5	T1.0	T0.05~0.3	T0.5	T1.0
CIRAF CIRABF CIRASF	10~ 100	10~100	(0.05) CIRAF is not available. 0.1 0.2 0.3 0.5 1.0									
	101~ 200	20~100										
		101~200										
	201~ 300	20~100										
		101~200										
		201~300										
	301~ 400	20~100										
		101~200										
		201~300										
	401~ 500	20~100										
		101~200										
		201~300										
	501~ 600	20~100										
		101~200										
		201~300										
	601~ 800	20~100										
		101~200										
		201~300										
	801~1000	20~100										
		101~200										
		201~300										

T=0.05··· B≤300

Ordering Example

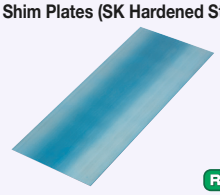
Part Number	-	A	-	B
CIRAB0.5	-	40	-	20

Part Number	-	A	-	B	-	T
CIRASF	-	527	-	118	-	0.2

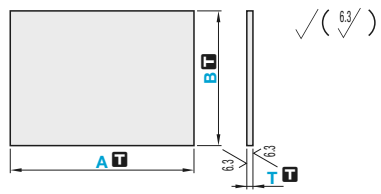
Shim Plates (SK Hardened Steel) / Shim Tapes / Shim Tape Boxes

Standard / Configurable

Shim Plates (SK Hardened Steel)



RoHS



Standard Type	Configurable	M Material	H Hardness
CIRAK	CIRAKF	SK	480~520HV

T Thickness (T) Tolerance				
0.1	0.2	0.3	0.5	1.0
±0.01	±0.015	±0.025	±0.03	±0.05

Standard

Part Number		Selection		Unit Price				
Type	T	A	B	0.1	0.2	0.3	0.5	1.0
CIRAK	0.1 0.2 0.3 0.5 1.0	100 250 500 1000	100					

Standard

T A/B Tolerances		
A	100~1000	±1
B	100	+2-1

Ordering Example

Part Number	-	A	-	B	
CIRAK0.1	-	100	-	100	
Part Number	-	A	-	B	- T
CIRAKF	-	100	-	50	- 0.1

Configurable

Part Number	1mm Increment		Selection	Unit Price				
	A	B	T	T0.1	T0.2	T0.3	T0.5	T1.0
CIRAKF	10~ 100	10 ~ 50 51 ~ 100	0.1 0.2 0.3 0.5 1.0					
	101~ 200	10 ~ 50 51 ~ 100						
	201~ 300	10 ~ 50 51 ~ 100						
	301~ 400	10 ~ 50 51 ~ 100						
	401~ 500	10 ~ 50 51 ~ 100						
	501~ 600	10 ~ 50 51 ~ 100						
	601~ 800	10 ~ 50 51 ~ 100						
	801~1000	10 ~ 50 51 ~ 100						

Specify as A≥B.

Configurable

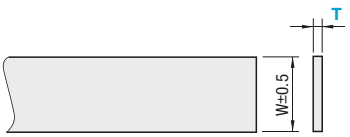
T A/B Tolerances		
A	10 ~ 399	±0.5
	400 ~ 799	±0.8
	800 ~1000	±1.2
B	10 ~ 90	±0.5
	91 ~ 100	+2-1

Shim Tapes

RoHS



Type	W	Length	M Material H Hardness
FGSM	12.7	1m	T=0.005,0.015⋯› M EN 1.4301 Equiv. H 370~420HV T=0.01,0.02~0.5⋯› M SK H 480~600HV
FGSMW	45.0		
FGSML	12.7	5m	
SFGSM	12.7	1m	M EN 1.4301 Equiv. H 370~420HV
SFGSMW	45.0		
SFGSML	12.7	5m	
DFGSMW	45.0	1m	M EN CW505L Equiv. or EN CW507L Equiv. H -



Standard (Length 1m)

Part Number Type	T	T Tolerance	Unit Price FGSM	FGSMW	SFGSM	SFGSMW	DFGSMW
FGSM SFGSM (W=12.7mm)	0.005	±0.0005			-	-	-
	0.01	±0.003					
	0.015						-
	0.02						
	0.03	±0.005					
	0.04						
	0.05						
	0.06						
	0.07						
	0.08						
FGSMW SFGSMW DFGSMW (W=45.0mm)	0.09						-
	0.1						-
	0.15						-
	0.2	±0.015					-
	0.25						-
	0.3						-
	0.35				-	-	-
	0.4				-	-	-
	0.45				-	-	-
	0.5				-	-	-

No specification available for those without value.

Long (Length 5m)

Part Number Type	T	T Tolerance	Unit Price FGSML	SFGSML
FGSML SFGSML (W=12.7mm)	0.005	±0.0005		-
	0.01	±0.003		
	0.015			
	0.02			
	0.03	±0.005		
	0.04			
	0.05			
	0.06			
	0.07			
	0.08			
	0.09			
	0.1			
	0.15			
	0.2	±0.015		

No specification available for those without value.

Ordering Example

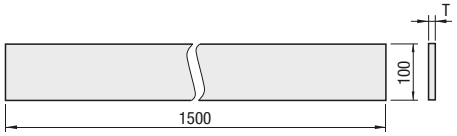
Part Number
FGSM0.01

Shim Tape Boxes

RoHS



CMBOXS



M Material: EN 1.4301 Equiv. H Hardness: 370 ~ 420HV

Part Number Type	No.	T	T Tolerance	Width	Length	Unit Price
CMBOXS	5	0.005	±0.0005	100mm	1500mm	
	10	0.01	±0.003			
	20	0.02				
	30	0.03	±0.005			
	40	0.04				
	50	0.05				
	60	0.06				
	80	0.08				
	100	0.10				
	150	0.15				
	200	0.20	±0.020			

As No.5 ~ 20 is extremely thin, shims may be wrinkled when pulled out.

- A Solid Shim Tape in a Box.

Ordering Example

Part Number
CMBOXS50

Major Usage

- Tool Installation
- Tolerance Adjustments
- Arrangement of Machinery and Equipment
- Adjustment of Equipment
- Installation of Equipment Bases
- Bearing Clearance Adjustments