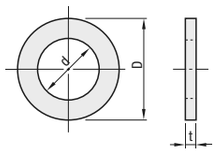
Flat washers and spring washers can be ordered by cost saving boxes. P.236

Flat Washer



RoHS

PWF
SPWF



	PWF	SPWF
M Material	EN 1.0330 Equiv.	EN 1.4301 Equiv.
S Surface Treatment	Trivalent Chromate	-

JIS B 1256

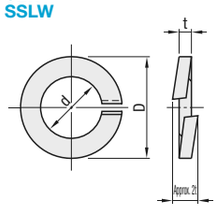
Part Number Type	Nominal	d	D PWF	D SPWF	t	PWF Unit Price 1 ~ 24 pc(s).	PWF Volume Discount Rate 25 ~ 199 pcs.	200 ~ 499 pcs.	500 ~ 1000 pcs.	SPWF Unit Price 1 ~ 24 pc(s).	SPWF Volume Discount Rate 25 ~ 199 pcs.	200 ~ 499 pcs.	500 ~ 1000 pcs.
PWF SPWF	2	2.2	4.3	5	0.3								
	2.5	2.7	5	6.5	0.5								
	2.6	2.8											
	3	3.2	6.0	7.0	0.5								
	4	4.3	8.0	9.0	0.8								
PWF	5	5.3	10.0	10.0	1.0								
SPWF	6	6.4	12.5	12.5	1.6								
	8	8.4	15.5	17.0									
	10	10.5	18.0	21.0	2.0								
	12	13.0	21.0	24.0	2.5								
	16	17.0	28.0	30.0	3.0								
	20	21.0	34.0	37.0									
	24	25.0	39.0	44.0	4.0								

Spring Washer



RoHS

SLW
SSLW



	SLW	SSLW
M Material	JIS-SWRH	EN 1.4311 Equiv.
S Surface Treatment	Trivalent Chromate	-

JIS B 1251

Part Number Type	Nominal	d	D	t	SLW Unit Price 1 ~ 24 pc(s).	SLW Volume Discount Rate 25 ~ 199 pcs.	200 ~ 499 pcs.	500 ~ 1000 pcs.	SSLW Unit Price 1 ~ 24 pc(s).	SSLW Volume Discount Rate 25 ~ 199 pcs.	200 ~ 499 pcs.	500 ~ 1000 pcs.
	2	2.1	4.4	0.5								
	2.5	2.6	5.2	0.6								
	2.6	2.7	5.3									
	3	3.1	5.9	0.7								
	4	4.1	7.6	1.0								
SLW	5	5.1	9.2	1.3								
SSLW	6	6.1	12.2	1.5								
	8	8.2	15.4	2.0								
	10	10.2	18.4	2.5								
	12	12.2	21.5	3.0								
	16	16.2	28.0	4.0								
	20	20.2	33.8	5.1								
	24	24.5	40.3	5.9								

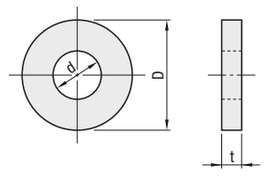
Ordering Example — Part Number: **PWF3**

Washers for Slotted Holes



RoHS

Type	M Material	S Surface Treatment
PACK-PWFN	EN 1.0330 Equiv.	Trivalent Chromate
PACK-SPWFN	EN 1.4301 Equiv.	-



Features
- Thicker flat washers than the standard type. Usable to prevent washers for slotted holes from falling.

Part Number Type	Nominal	PACK-PWFN d	D	T	PACK-SPWFN d	D	T	Number of pieces	PACK-PWFN Unit Price 1 ~ 2 pkg(s).	PACK-PWFN Volume Discount Rate 3 pkgs. or More	PACK-SPWFN Unit Price 1 ~ 2 pkg(s).	PACK-SPWFN Volume Discount Rate 3 ~ 500 pkgs.
	3	3.4	8	1	3.3	8	1	50				
	4	4.5	10	1.6	4.5	10	1.5	50				
PACK-PWFN	5	5.5	16	2	5.5	12	2	20				
PACK-SPWFN	6	6.5	16	3.2	6.5	13	3	20				
	8	8.5	20	3	8.5	22	3	20				

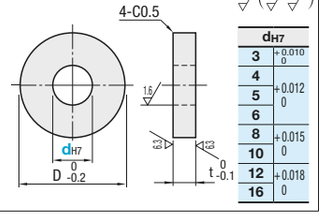
For orders larger than indicated quantity, please check with WOS.

Metal Washers



M Material: EN 1.0038 Equiv. RoHS

LOWA



dH7
3 +0.010 0
4
5 +0.012 0
6
8 +0.015 0
10
12 +0.018 0
16

Part Number Type	d	D	t	Unit Price 1 ~ 49 pc(s).	Volume Discount Rate 50 ~ 99 pcs.	100 ~ 200 pcs.	201 ~ 300 pcs.
LOWA	3	6	5				
	4	10					
	5						
	6	14	8				
	8	18					
	10	22					
	12	25	10				
	16	32					

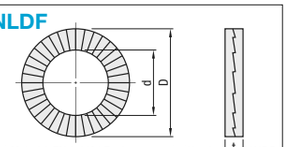
For orders larger than indicated quantity, please check with WOS.

Ordering Example — Part Number: **PACK-PWFN3**, **LOWA5**



RoHS

NLDF



M Material: EN 1.4404 Equiv. H Hardness: 51HRC

Part Number Type	No.	Applicable Screw	D	d	t	Unit Price 1 ~ 9 pc(s).	Volume Discount Rate 10 ~ 200 pcs.
NLDF	3	M3	7	3.4	2.2		
	4	M4	7.6	4.4			
	5	M5	9	5.4			
	6	M6	10.8	6.5			
	8	M8	13.5	8.7	2.0		
	10	M10	16.6	10.7			
	12	M12	19.5	13			

This product is to be used in pairs.

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

Ordering Example — Part Number: **NLDF3**

Principle of Lock Washers

A pair of washers with wedge cams on one side and radial ribs on the other side each to compose a self-locking arrangement.
Cam angle (α) is set to be larger than the thread lead angle (β).
When the screw begins to rotate loose, a force is generated by a cam member to push up and separate from the opposite cam member. The rotation is blocked by the wedge effect and the cams will not be separated by more than one thread pitch.

Proper Installation

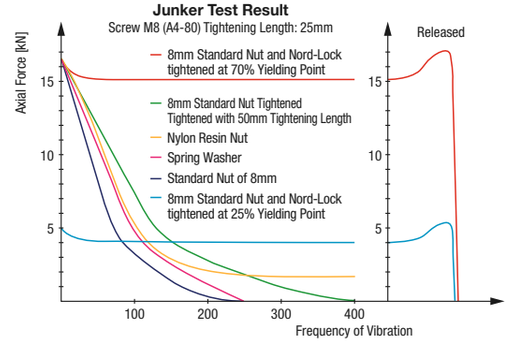
The washers come pre-assembled in pairs (glued).
Upon reusing, please confirm the cams are not worn or cracked, and follow the installation instruction on the right.
Do not use together with other washers.

Cautions on Repeated Use

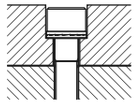
NLDF can be used repeatedly with a lubricant. Use lubricant for repeated use.

Allowable Temperature

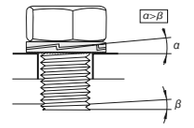
Temperature limit for NLDF is 500°C.
Do not use in an environment where the temperature limit is exceeded.



Example



Counterbore dia. does not need to be increased.



Correct Incorrect Incorrect



About Mating Materials

On the surface of mating materials, there will be impression marks made by the radial teeth of the washers.
The hardness of the mating surfaces should not exceed the hardness of the Nord-Lock Washers.

Recommended Tightening Torque and Tightening Force

Please refer to the values listed below as guidelines when securing a screw with a lock washer.
There is no self-locking effect when the values are far below recommended values.
If the tightened torque exceeds the recommended values, loosening the screws may become impossible or Nord-Lock may be broken.

Screw Tightening Torque and Recommended Tightening Force when Lock Washer is Used.
(Lubricant GTP600)

NLDF	Applicable Screw MxP	Screw Strength Class: A2-70 / A4-70 GF=0.65 μg=0.14 μw=0.14 Torque N·m	Tightening Force kN	Screw Strength Class: A2-80 / A4-80 GF=0.65 μg=0.14 μw=0.14 Torque N·m	Tightening Force kN
3	3x0.5	0.9	1.5	1.2	2
4	4x0.7	2	2.6	2.7	3.4
5	5x0.8	3.9	4.1	5.3	5.5
6	6x1.0	6.9	5.9	9.2	7.8
8	8x1.25	17	11	22	14
10	10x1.5	33	17	43	23
12	12x1.75	56	25	75	33

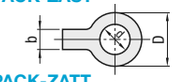
GF: Coefficient at the Yield Point μg: Coefficient of Friction at Screw Thread μw: Coefficient of Friction in Washer

Tab Washers-One-Tabbed / Tab Washers-Two-Tabbed

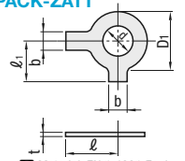


10 pcs. per pkg. RoHS

PACK-ZAST



PACK-ZATT



M Material: EN 1.4301 Equiv.

Part Number Type	No.	d	D	D1	t	ℓ	ℓ1	b	Unit Price 1 ~ 9 pkg(s).	Volume Discount Rate 10 ~30 pkgs.
PACK-ZAST PACK-ZATT	3	3.2	12	7	0.29	13	5	4		
	4	4.3	14	9		14	7	5		
	5	5.3	17	10		15	8	6		
	6	6.5	18	13	0.5		9			
	8	8.5	22	16		20	13	7		
	10	10.5	26	20	0.8	22	14	9		
	12	12.5	30	24		27	19	10		
	16	17	38	30		32	24	12		
	20	21	45	38	1.2	36	28	15		
	24	25	52	44		44	35	17		

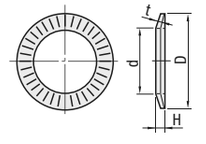
For orders larger than indicated quantity, please check with WOS.

Serrated Conical Disc Spring Washers



RoHS

GTS



M Material: From EN 1.1206 Equiv. to S70C
H Hardness: 40 to 48HRC
S Surface Treatment: Tempered Collar
JIS B 1251

Part Number Type	No.	D	d	H	t	Unit Price * Less than	Volume Discount Rate * or More	* Quantity
GTS	3	5.5	3.2	0.6	0.45			15000
	4	7	4.25	0.7	0.5			10000
	5	8.5	5.25	0.85	0.6			5000
	6	10	6.4	1.25	1.0			6000
	8	13	8.4	1.55	1.2			3000
	10	16	10.6	1.90	1.5			2000
	12	18	12.6	2.20	1.8			1000
	16	24	16.9	2.80	2.3			500
	20	30	20.9	3.55	2.8			250
	24	36	25.4	4.25	3.5			150

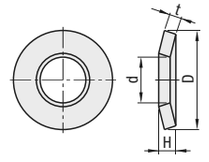
No.3 to 5, Light Load; No.6 to 24, Heavy Load

Disc Spring Washers



RoHS

SSRBW



M Material: EN 1.4301 (CSP) Equiv.
H Hardness: 37 to 46HRC
JIS B 1251 Class 2 Equiv.

Part Number Type	No.	D	d	H	t	Unit Price 1 - 49 pc(s).	Volume Discount Rate 50~69	70~99	100~500
SSRBW	4	7.5	4.3	0.7	0.45				
	5	9.0	5.3	0.85	0.55				
	6	10.5	6.4	0.95	0.60				
	8	13.5	8.4	1.3	0.90				
	10	16.5	10.5	1.6	1.10				
	12	19.0	13.0	1.75	1.20				

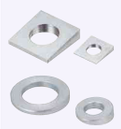
Light Load

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

Ordering Example — Part Number: **PACK-ZAST3**, **GTS10**, **SSRBW8**

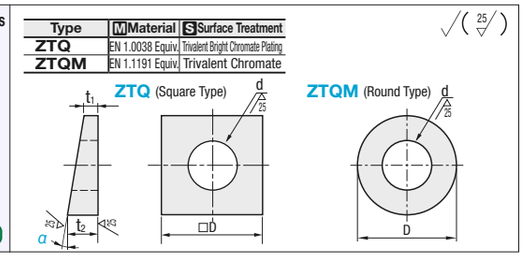
Tapered Washers / Tapered Nuts / Square Nuts / Square Washers

■Tapered Washers



RoHS

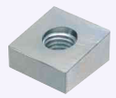
Type	M Material	S Surface Treatment
ZTQ	EN 1.0038 Equiv.	Trivalent Bright Chromate Plating
ZTQM	EN 1.1191 Equiv.	Trivalent Chromate



Part Number Type	No.	Angle α	d	D	Angle 3° t1	Angle 3° t2	Angle 5° t1	Angle 5° t2	Angle 8° t1	Angle 8° t2	ZTQ Unit Price 1 ~ 49 pc(s).	ZTQ Volume Discount Rate 50 ~ 200 pcs.	ZTQM Unit Price 1 ~ 49 pc(s).	ZTQM Volume Discount Rate 50 ~ 100 pcs.
ZTQ ZTQM	6	3	7	16	1.2	2	1.6	3	1.7	4				
	8		9	18	1.1		1.4		1.5					
	10		11	22	1.8	3	2	4	1.9	5				
	12	5	14	26	1.6		1.7		2.3	6				
	16	8	18	32	3.3	5	3.2	6	3.5	8				
	20		21	40	2.9		2.5		3.4	9				
	24		27	52	3.3	6	3.5	8	3.7	11				

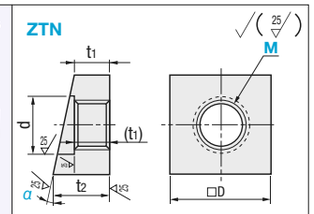
Ordering Example: Part Number - α
ZTQ6 - 5

■Tapered Nuts



RoHS

ZTN



M Material: EN 1.0038 Equiv.
S Surface Treatment: Trivalent Bright Chromate Plating

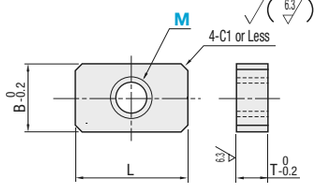
Part Number Type	M (Coarse)	Angle α	D	Angle 3° t1	Angle 3° t2	Angle 5° t1	Angle 5° t2	Angle 8° t1	Angle 8° t2	d	Unit Price 1 ~ 49 pc(s).	Volume Discount Rate 50 ~ 100 pcs.
ZTN	6	3	16	5	5.8	5	6.4	5	7.2	7		
	8		18	6.5	7.4	6.5	8.1	6.5	9	9		
	10	5	22	8	9.2	8	9.9	8	11.1	11		
	12	8	26	10	11.3	10	12.2	10	13.5	13		
	16		32	13	14.7	13	15.8	13	17.5	17		

■Square Nuts

NSQ



RoHS



M Material: EN 1.0038 Equiv. S Surface Treatment: Trivalent Bright Chromate Plating

Part Number Type	M (Coarse)	L	B	T	Unit Price 1 ~ 49 pc(s).	Volume Discount Rate 50 ~ 500 pcs.
NSQ	4	7	7	3.2		
	5	8	8	4		
	6	16	10	4.5		
	8	42	15.5	6		

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

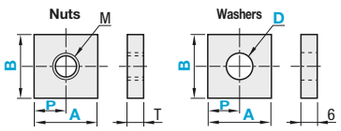
Ordering Example: Part Number
NSQ8

■Square Nuts, Square Washers - Dim. Configurable 1-Hole



RoHS

Type Nuts	Type Washers	M Material	S Surface Treatment
FKT	FKW	EN 1.1191 (cold drawn) Equiv.	-
FKTB	FKWB	EN 1.1191 (cold drawn) Equiv.	Black Oxide
FKTS	FKWS	EN 1.4301 Equiv.	-



Part Number Type	B	1mm Increment A	0.5mm Increment P	M (Coarse)	T	Unit Price FKT	FKTB	FKTS
Nuts FKT FKTB FKTS	16	16~50	M/2+2≤P≤A-M/2-2	6	6			
	22			8	6			
	25			10	9			
	38			12	10			

Part Number Type	B	1mm Increment A	0.5mm Increment P	D Selection	Unit Price FKW	FKWB	FKWS
Washers FKW FKWB FKWS	16	16~50	D/2+2≤P≤A-D/2-2	7 9			
	22			7 9			
	25			7 9 11 14			
	38			7 9 11 14			

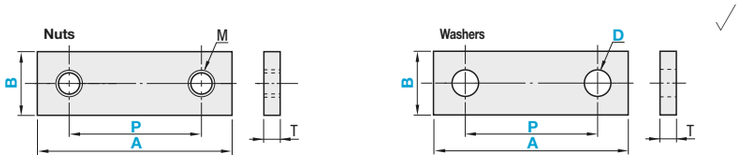
Ordering Example: Part Number - A - P - D
FKW16 - A20 - P10 - D7

■Square Nuts, Square Washers2-Hole



RoHS

Type Nuts	Type Washers	M Material	S Surface Treatment
FK2T	FK2W	EN 1.1191 (cold drawn) Equiv.	-
FK2TB	FK2WB	EN 1.1191 (cold drawn) Equiv.	Black Oxide
FK2TS	FK2WS	EN 1.4301 Equiv.	-



Part Number Type	B	A	P	M	T	Unit Price 1 ~ 4 pc(s).	Volume Discount Rate 5 ~ 9 pcs.	10 ~ 49 pcs.	50 ~ 200 pcs.
Nuts FK2TS	10	25	15	2	3				
		30	20	3	3				
		35	25	3	3				
		50	40	3	3				
	16	30	15	6	6				
		40	20	6	6				
		50	30	6	6				
		60	40	6	6				
		120	100	6	6				

Ordering Example: Part Number - A - P
FK2TS10 - A25 - P15

Part Number Type	B	1mm Increment A	1mm Increment P	M (Coarse)	T
Nuts FK2T FK2TB FK2TS	6	30~200	2M≤P≤A-2M	3	2
	10			3	3
	16			6	6
	22			8	6
	25			10	9
	38			12	10

Part Number Type	B	1mm Increment A	1mm Increment P	D Selection	T
Washers FK2W FK2WB FK2WS	6	30~200	2D≤P≤A-2D	4	2
	10			4 6	3
	16			7 9	6
	22			7 9	6
	25			7 9 11 14	6
	38			7 9 11 14	6

B		Unit Price A30~50	A51~100	A101~150	A151~200
6	FK2TS				
10	FK2TS				
16	FK2T				
	FK2TB				
	FK2TS				
22	FK2T				
	FK2TB				
	FK2TS				
25	FK2T				
	FK2TB				
	FK2TS				
38	FK2T				
	FK2TB				
	FK2TS				

B		Unit Price A30~50	A51~100	A101~150	A151~200
6	FK2WS				
10	FK2WS				
16	FK2W				
	FK2WB				
	FK2WS				
22	FK2W				
	FK2WB				
	FK2WS				
25	FK2W				
	FK2WB				
	FK2WS				
38	FK2W				
	FK2WB				
	FK2WS				

Ordering Example: Part Number - A - P - D
FK2T16 - A40 - P25
FK2WS25 - A50 - P20 - D7