


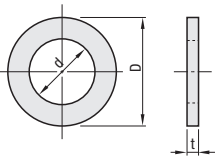
Flat Washers / Spring Washers / Metal Washers

Flat Washers




RoHS 10

PWF
SPWF



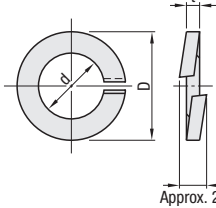
Type	Material	Surface Treatment
PWF	Low Carbon Steel Equivalent	Trivalent Chromate JIS B 1256
SPWF	304 Stainless Steel	—

Spring Washers



RoHS 10

SLW
SSLW




Approx. 2t

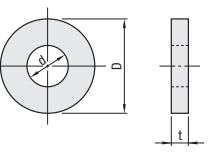
Type	Material	Surface Treatment
SLW	JIS-SWRH	Trivalent Chromate JIS B 1251
SSLW	304 Stainless Steel N	—

Part Number Example: PWF3

Washers for Slotted Holes

Type	Material	Surface Treatment
PACK-PWFN	Low Carbon Steel	Trivalent Chromate
PACK-SPWFN	304 Stainless Steel	—



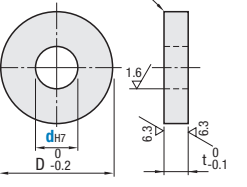


Features
Thicker flat washers than the standard type. Usable to prevent washers for Slotted Holes from falling.

RoHS 10

Metal Washers

LOWA



d _{H7}	d _{H7}
3	+0.010
4	0
5	+0.012
6	0
8	+0.015
10	0
12	+0.018
16	0

Materials: 1018 Carbon Steel

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Part Number Example: PACK-PWFN3 LOWA5

Part Number Type	Nominal	d	D		t
			PWF	SPWF	
PWF	2	2.2	4.3	5	0.3
	2.5	2.7			
	2.6	2.8	5	6.5	0.5
	3	3.2	6.0	7.0	0.5
	4	4.3	8.0	9.0	0.8
	5	5.3	10.0	10.0	1.0
	6	6.4	12.5	12.5	
	8	8.4	15.5	17.0	1.6
	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	
	20	21.0	34.0	37.0	3.0
SPWF	24	25.0	39.0	44.0	4.0

Part Number Type	Nominal	d	D	t
2.5	2.6	5.2		
2.6	2.7	5.3	0.6	
3	3.1	5.9	0.7	
4	4.1	7.6	1.0	
5	5.1	9.2	1.3	
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	

Part Number Type	Nominal	PACK-PWFN			PACK-SPWFN			No. of Pieces
		d	D	T	d	D	T	
PACK-PWFN	3	3.4	8	1	3.3	8	1	50
	4	4.5	10	1.6	4.5	10	1.5	50
	5	5.5	16	2	5.5	12	2	20
	6	6.5	16	3.2	6.5	13	3	20
PACK-SPWFN	8	8.5	20	3	8.5	22	3	20

Part Number Type	d	D	t
4	10	5	
5			
6	14		
8	18	8	
10	22		
	12	25	
	16	32	10

Lock Washers (Nord-Lock) / Tab Washers / Serrated Conical Disc Spring Washers / Disc Spring Washers

Lock Washers – Nord-Lock



RoHS 10

NLDF



Material: 316 Stainless Steel or Equivalent
Hardness: 51 HRC min.

This product is to be used in pairs.

Part Number Example: 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 attempts 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 separate by more than one thread pitch.

Proper Installation

Set up correctly as shown in the image to the right. Do not use together with other washers.

Cautions on Repeated Use

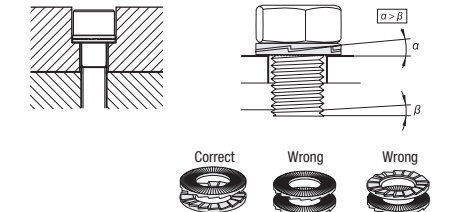
NLDF can be used repeatedly with a lubricant.

Allowable Temperature

Temperature limit for NLDF is 500°C. Do not use in an environment when it exceeds the temperature limit.

Application Example

Counterbore dia. does not need to be increased.



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.

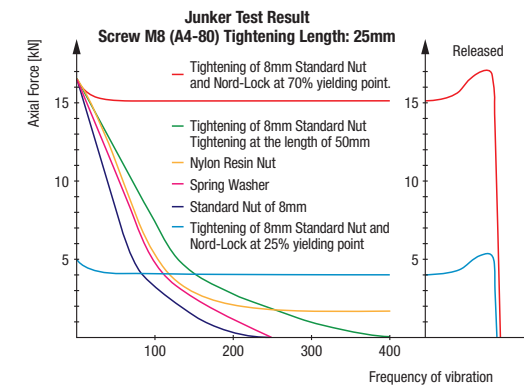
Recommended Tightening Torque and Tightening Force

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 Screws M x P	Screw Strength Class A2-70, A4-70 G=0.65 μg=0.14, μw=0.14		Screw Strength Class A2-80, A4-80 GF=0.65 μg=0.14, μw=0.14	
		Torque N·m	Tightening Force kN	Torque N·m	Tightening Force kN
3	3 x 0.5	0.9	1.5	1.2	2
4	4 x 0.7	2	2.6	2.7	3.4
5	5 x 0.8	3.9	4.1	5.3	5.5
6	6 x 1.0	6.9	5.9	9.2	7.8
8	8 x 1.25	17	11	22	14
10	10 x 1.5	33	17	43	23
12	12 x 1.75	56	25	75	33


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



Tab Washers One-Tabbed Two-Tabbed

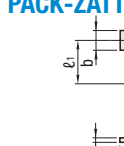
10/Pkg

PACK-ZAST



RoHS 10

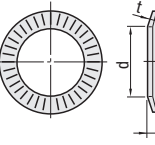
PACK-ZATT



Material: 304 Stainless Steel

Serrated Conical Disc Spring Washers

GTS



Material: From 1049 Carbon Steel to S70C
Hardness: 40~48 HRC min.
Surface Treatment: Tempered Collar JIS B 1251

RoHS 10

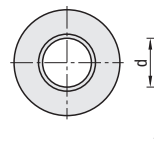
Part Number Type	No.	d	D	D ₁	t	ℓ	ℓ ₁	b	
									PACK-ZAST
4	4.3	14	9		14	7	5		
5	5.3	17	10			8			
6	6.5	18	13	0.5		9	6		
8	8.5	22	16			20	13	7	
10	10.5	26	20			22	14	9	
PACK-ZATT	12	12.5	30	24	0.8		27	19	10
	16	17	38	30			32	24	12
	20	21	45	38	1.2		36	28	15
	24	25	52	44			44	35	17

Part Number Type	No.	D	d	H	t
4	7	4.25	0.7	0.5	
5	8.5	5.25	0.85	0.6	
6	10	6.4	1.25	1.0	
8	13	8.4	1.55	1.2	
10	16	10.6	1.90	1.5	
12	18	12.6	2.20	1.8	
16	24	16.9	2.80	2.3	
20	30	20.9	3.55	2.8	
24	36	25.4	4.25	3.5	

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

Disc Spring Washers

SSRBW



Material: 304 Stainless Steel
Hardness: 37~46 HRC min.
JIS B 1251 Class 2 Equivalent

RoHS 10

Part Number Type	No.	D	d	H	t
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

Part Number Example: PACK-ZAST3 GTS10 SSRBW8