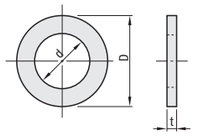
Flat Washers / Spring Washers / Metal Washers

Flat Washers

PWF
SPWF



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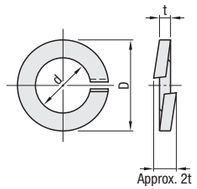
Type	Material	Surface Treatment
PWF	Low Carbon Steel Equivalent	Trivalent Chromate JIS B 1256
SPWF	304 Stainless Steel	—

Part Number Type	Part Number Nominal	d	D PWF	D SPWF	t
PWF	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
	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 Washers

SLW
SSLW



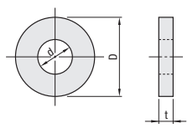
Type	Material	Surface Treatment
SLW	JIS-SWRH	Trivalent Chromate JIS B 1251
SSLW	304 Stainless Steel N	—

Part Number Type	Part Number Nominal	d	D	t
SLW	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
	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

Part Number Example — Part Number: 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.

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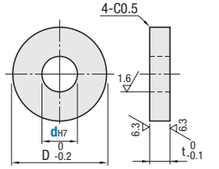
Part Number Type	Part Number Nominal	PACK-PWFN d	PACK-PWFN D	PACK-PWFN T	PACK-SPWFN d	PACK-SPWFN D	PACK-SPWFN T	No. of Pieces
PACK-PWFN PACK-SPWFN	3	3.4	8	1	3.3	8	1	50
	4	4.5	10	1.6	4.5	10	1.5	50
	5	5.5	16	2	5.5	12	2	20
	6	6.5	16	3.2	6.5	13	3	20
	8	8.5	20	3	8.5	22	3	20

Metal Washers

LOWA



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

Materials: 1018 Carbon Steel

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Part Number Type	Part Number d	D	t
LOWA	3	6	5
	4	10	
	5		
	6	14	8
	8	18	
	10	22	
	12	25	10
	16	32	

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

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

Lock Washers – Nord-Lock

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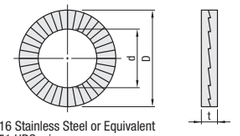
NLDF



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

Part Number Type	Part Number No.	Applicable Screw	D	d	t
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.

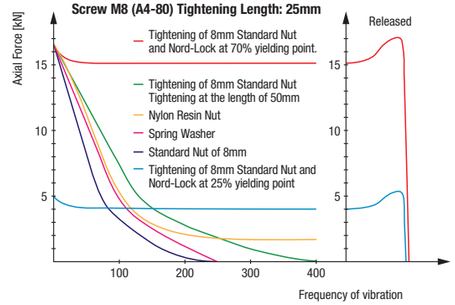
Part Number Example — Part Number: NLDF3

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 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.

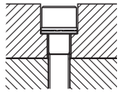
Proper Installation
Set up correctly as shown in the image to the right.
Do not use together with other washers.

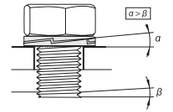
Cautions on Repeated Use
NLDF can be used repeatedly with a lubricant.

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_F=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	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_F: 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

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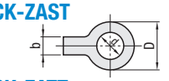
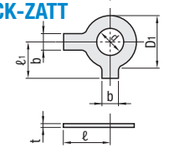
PACK-ZAST



PACK-ZATT

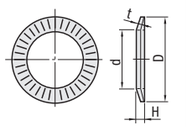


Material: 304 Stainless Steel

Part Number Type	Part Number No.	d	D	D_1	t	ℓ	$ℓ_1$	b
PACK-ZAST	3	3.2	12	7	0.29	13	5	4
	4	4.3	14	9		14	7	5
	5	5.3	17	10	0.5	15	8	6
	6	6.5	18	13			9	
	8	8.5	22	16		20	13	7
PACK-ZATT	10	10.5	26	20	0.8	22	14	9
	12	12.5	30	24		27	19	10
	16	17	38	30	1.2	32	24	12
	20	21	45	38		36	28	15
	24	25	52	44		44	35	17

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

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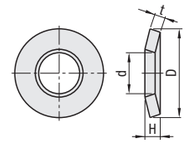
Part Number Type	Part Number No.	D	d	H	t
GTS	3	5.5	3.2	0.6	0.45
	4	7	4.25	0.7	0.5
	5	8.5	5.25	0.85	0.6
	6	10	6.4	1.25	1.0
	8	13	8.4	1.55	1.2
	10	16	10.6	1.90	1.5
	12	18	12.6	2.20	1.8
	16	24	16.9	2.80	2.3
	20	30	20.9	3.55	2.8
	24	36	25.4	4.25	3.5

ⓘ 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

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Part Number Type	Part Number No.	D	d	H	t
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

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