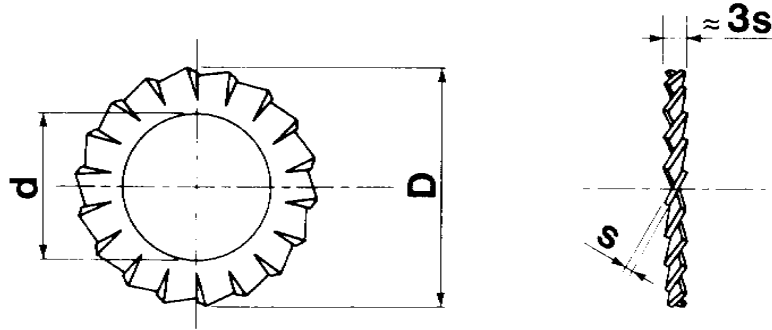


Metric Lock Washers (DIN 6798)

Plain, Zinc Plated & Stainless Steel



DIN 6798 A External Tooth

Part No.	For Screw Ø mm	Lock Washer Dimensions				Teeth	Weight kg/ 1000
		d_{h13}	D_{h14}	s			
L 2 A	2	2.2	4.5	0.3	9	0.025	
L 2.3 A	2.3	2.5	5	0.4	9	0.041	
L 2.5 A	2.5	2.7	5.5	0.4	9	0.049	
L 2.6 A	2.6	2.8	5.5	0.4	9	0.049	
L 3 A	3	3.2	6	0.4	9	0.061	
L 3.5 A	3.5	3.7	7	0.5	10	0.100	
L 4 A	4	4.3	8	0.5	11	0.135	
L 5/9 A	5	5.1	9	0.5	11	0.165	
L 5/10 A	5	5.3	10	0.6	11	0.250	
L 6 A	6	6.4	11	0.7	12	0.302	
L 7 A	7	7.4	12.5	0.8	14	0.421	
L 8/14 A	8	8.2	14	0.8	14	0.559	
L 8/15 A	8	8.4	15	0.8	14	0.679	
L 9 A	9	9.55	16	0.8	14	0.740	
L 10 A	10	10.5	18	0.9	16	1.098	
L 11 A	11	11.5	19.5	0.9	16	1.256	
L 12 A	12	13	20.5	1	16	1.475	
L 13 A	13	13.2	22	1	16	1.711	
L 14 A	14	15	24	1	18	2.142	
L 16 A	16	17	26	1.2	18	2.780	
L 18 A	18	19	30	1.4	18	4.272	
L 20 A	20	21	33	1.4	20	5.150	
L 22 A	22	23	36	1.5	20	6.570	
L 24 A	24	25	38	1.5	20	7.100	
L 26 A	26	26.4	40	1.6	20	8.127	
L 27 A	27	28	44	1.6	22	10.900	
L 30 A	30	31	48	1.6	22	12.980	

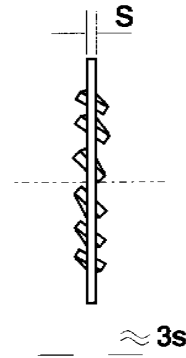
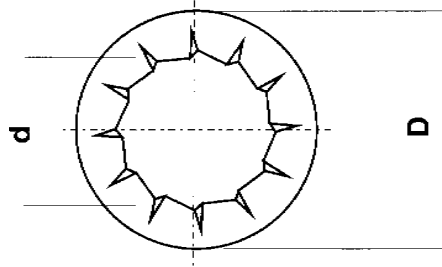
Hardness = HRc 38 - 45

Ordering Example:

- L 4 A = Plain
- L 4 AZ = Zinc Plated
- L 4 A 304SS = 304 Stainless Steel
- L 4 A 316SS = 316 Stainless Steel

Metric Lock Washers (DIN 6798)

Plain, Zinc Plated & Stainless Steel



DIN 6798 J Internal Tooth

Part No.	For Screw Ø mm	Lock Washer Dimensions				Teeth	Weight kg/ 1000
		d_{h13}	D_{h14}	s			
L 2 J	2	2.2	4.5	0.3	7	0.024	
L 2.3 J	2.3	2.5	5	0.4	7	0.043	
L 2.5 J	2.5	2.7	5.5	0.4	7	0.054	
L 2.6 J	2.6	2.8	5.5	0.4	7	0.050	
L 3 J	3	3.2	6	0.4	7	0.056	
L 3.5 J	3.5	3.7	7	0.5	8	0.098	
L 4 J	4	4.3	8	0.5	8	0.126	
L 5/9 J	5	5.1	9	0.5	8	0.154	
L 5/10 J	5	5.3	10	0.6	8	0.236	
L 6 J	6	6.4	11	0.7	9	0.310	
L 7 J	7	7.4	12.5	0.8	10	0.417	
L 8/14 J	8	8.2	14	0.8	10	0.566	
L 8/15 J	8	8.4	15	0.8	10	0.630	
L 9 J	9	9.55	16	0.8	10	0.668	
L 10 J	10	10.5	18	0.9	12	1.103	
L 11 J	11	11.5	19.5	0.9	12	1.260	
L 12 J	12	13	20.5	1	12	1.414	
L 13 J	13	13.2	22	1	12	1.719	
L 14 J	14	15	24	1	14	1.994	
L 16 J	16	17	26	1.2	14	2.640	
L 18 J	18	19	30	1.4	14	4.620	
L 20 J	20	21	33	1.4	16	5.549	
L 22 J	22	23	36	1.5	16	6.520	
L 24 J	24	25	38	1.5	16	7.040	
L 26 J	26	26.4	40	1.6	16	8.810	
L 27 J	27	28	44	1.6	18	10.010	
L 30 J	30	31	48	1.6	18	12.770	

Hardness = HRc 38 - 45

Ordering Example:

L 4 J = Plain

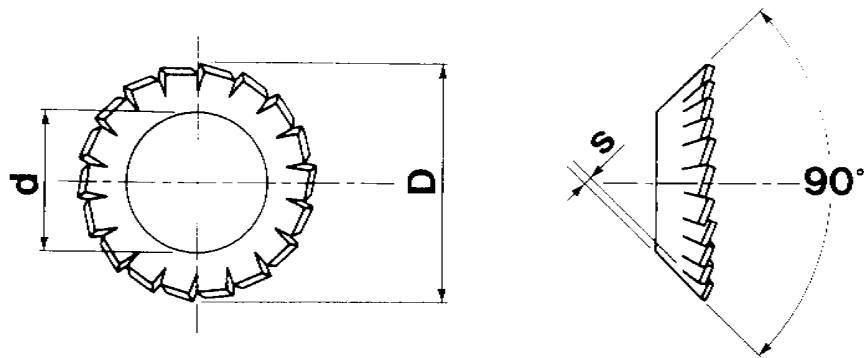
L 4 JZ = Zinc Plated

L 4 J 304SS = 304 Stainless Steel

L 4 J 316SS = 316 Stainless Steel

Metric Lock Washers (DIN 6798)

Plain, Zinc Plated & Stainless Steel



DIN 6798 V

V Shape for Countersink

Part No.	For Screw Ø mm	Lock Washer Dimensions				Teeth	Weight kg/ 1000
		d_{h13}	D	s			
L 3 V	3	3.2	6	0.2	12	0.051	
L 3.5 V	3.5	3.7	7	0.25	12	0.074	
L 4 V	4	4.3	8	0.25	14	0.081	
L 5 V	5	5.3	9.8	0.3	14	0.136	
L 6 V	6	6.4	11.8	0.4	16	0.278	
L 8 V	8	8.4	15.3	0.4	18	0.457	
L 10 V	10	10.5	19	0.5	20	0.872	
L 12 V	12	13	23	0.5	26	1.340	
L 14 V	14	15	26.2	0.6	28	2.110	
L 16 V	16	17	30.2	0.6	30	2.850	

Hardness = HRc 38 - 45

Ordering Example:

L 4 V = Plain

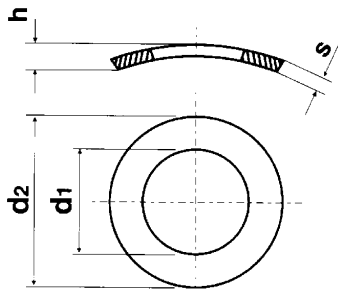
L 4 VZ = Zinc Plated

L 4 V 304SS = 304 Stainless Steel

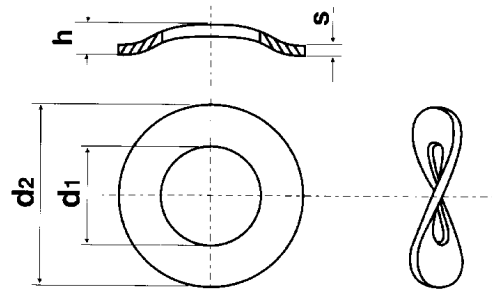
L 4 V 316SS = 316 Stainless Steel

Metric Spring Washers (DIN 137)

Plain & Zinc Plated



DIN 137 A (Bowed)



DIN 137 B (Waved)

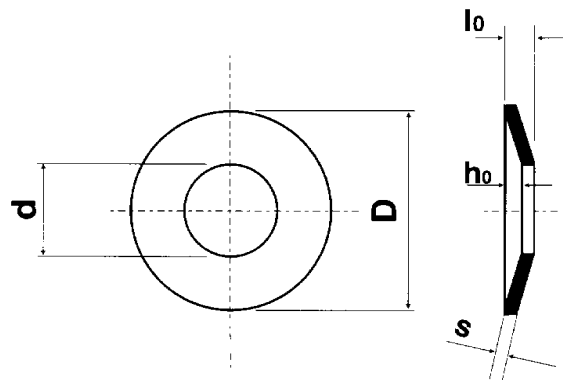
Part No.	For Screw Ø mm	Spring Washer Dimensions						Weight kg/ 1000
		d ₁ h 14	d ₂ J 16	h min	h max	S		
S 2 A	2	2.2	4.5	0.5	1	0.3	0.027	
S 2.3 A	2.3	2.5	5	0.5	1	0.3	0.032	
S 2.5 A	2.5/2.6	2.8	5.5	0.55	1.1	0.3	0.040	
S 3 A	3	3.2	6	0.65	1.3	0.4	0.060	
S 3.5 A	3.5	3.7	7	0.7	1.4	0.4	0.090	
S 4 A	4	4.3	8	0.8	1.6	0.5	0.125	
S 5 A	5	5.3	10	0.9	1.8	0.5	0.200	
S 6 A	6	6.4	11	1.1	2.2	0.5	0.229	
S 7 A	7	7.4	12	1.2	2.4	0.5	0.236	
S 8 A	8	8.4	15	1.7	3.4	0.5	0.437	
S 10 A	10	10.5	18	2	4	0.8	0.979	
S 3 B	3	3.2	8	0.8	1.6	0.5	0.157	
S 3.5 B	3.5	3.7	8	0.9	1.8	0.5	0.139	
S 4 B	4	4.3	9	1	2	0.5	0.175	
S 5 B	5	5.3	11	1.1	2.2	0.5	0.266	
S 6 B	6	6.4	12	1.3	2.6	0.5	0.282	
S 7 B	7	7.4	14	1.5	3	0.8	0.620	
S 8/15 B	8	8.4	15	1.5	3	0.8	0.670	
S 8/17 B	8	8.4	17	1.7	3.4	0.8	1.020	
S 10/18 B	10	10.5	18	2.1	4.2	1	1.190	
S 10/21 B	10	10.5	21	2.1	4.2	1	1.911	
S 12 B	12	13	24	2.5	5	1.2	2.810	
S 14 B	14	15	28	3	6	1.6	4.990	
S 16 B	16	17	30	3.2	6.4	1.6	5.110	
S 18 B	18	19	34	3.3	6.6	1.6	7.090	
S 20 B	20	21	36	3.7	7.4	1.6	7.460	
S 22 B	22	23	40	3.9	7.8	1.8	11.430	
S 24 B	24	25	44	4.1	8.2	1.8	13.560	
S 27 B	27	28	50	4.7	9.4	2	20.480	
S 30 B	30	31	56	5	10	2.2	28.700	

Hardness = HRC 44 - 51

Ordering Example:

- S 4 A = Bowed Washer
- S 4 AZ = Zinc Plated Bowed Washer
- S 4 B = Waved Washer
- S 4 BZ = Zinc Plated Waved Washer

Metric Spring Washers (DIN 2093 A&B)



Part No.	D h 12	d H 12	s	h ₀	l ₀	F N	δ N/mm ²	Weight kg/ 1000
DS 8 A	8	4.2	0.4	0.2	0.6	210	1,220	0.100
DS 10 A	10	5.2	0.5	0.25	0.75	329	1,240	0.204
DS 12.5 A	12.5	6.2	0.7	0.3	1	673	1,420	0.468
DS 14 A	14	7.2	0.8	0.3	1.1	813	1,340	0.654
DS 16 A	16	8.2	0.9	0.35	1.25	1,000	1,290	0.994
DS 18 A	18	9.2	1	0.4	1.4	1,250	1,300	1.374
DS 20 A	20	10.2	1.1	0.45	1.55	1,530	1,300	1.880
DS 22.5 A	22.5	11.2	1.25	0.5	1.75	1,950	1,320	2.780
DS 25 A	25	12.2	1.5	0.55	2.05	2,910	1,410	4.126
DS 28 A	28	14.2	1.5	0.65	2.15	2,850	1,280	5.150
DS 31.5 A	31.5	16.3	1.75	0.7	2.45	3,900	1,310	7.460
DS 35.5 A	35.5	18.3	2	0.8	2.8	5,190	1,330	11.030
DS 40 A	40	20.4	2.25	0.9	3.15	6,540	1,340	15.630
DS 45 A	45	22.4	2.5	1	3.5	7,720	1,300	22.700
DS 50 A	50	25.4	3	1.1	4.1	12,000	1,430	33.070
DS 56 A	56	28.5	3	1.3	4.3	11,400	1,280	41.200
DS 63 A	63	31	3.5	1.4	4.9	15,000	1,300	62.300
DS 8 B	8	4.2	0.3	0.25	0.55	119	1,330	0.080
DS 10 B	10	5.2	0.4	0.3	0.7	213	1,330	0.161
DS 12.5 B	12.5	6.2	0.5	0.35	0.85	291	1,110	0.332
DS 14 B	14	7.2	0.5	0.4	0.9	279	1,110	0.383
DS 16 B	16	8.2	0.6	0.45	1.05	412	1,120	0.659
DS 18 B	18	9.2	0.7	0.5	1.2	572	1,130	1.050
DS 20 B	20	10.2	0.8	0.55	1.35	745	1,110	1.370
DS 22.5 B	22.5	11.2	0.8	0.65	1.45	710	1,080	1.770
DS 25 B	25	12.2	0.9	0.7	1.6	868	1,030	2.500
DS 28 B	28	14.2	1	0.8	1.8	1,110	1,090	3.440
DS 31.5 B	31.5	16.3	1.25	0.9	2.15	1,920	1,190	5.360
DS 35.5 B	35.5	18.3	1.25	1	2.25	1,700	1,070	6.780
DS 40 B	40	20.4	1.5	1.15	2.65	2,620	1,130	10.550
DS 45 B	45	22.4	1.75	1.3	3.05	3,660	1,150	15.800
DS 50 B	50	25.4	2	1.4	3.4	4,760	1,140	22.200
DS 56 B	56	28.5	2	1.6	3.6	4,440	1,090	27.630
DS 63 B	63	31	2.5	1.75	4.25	7,180	1,090	44.700

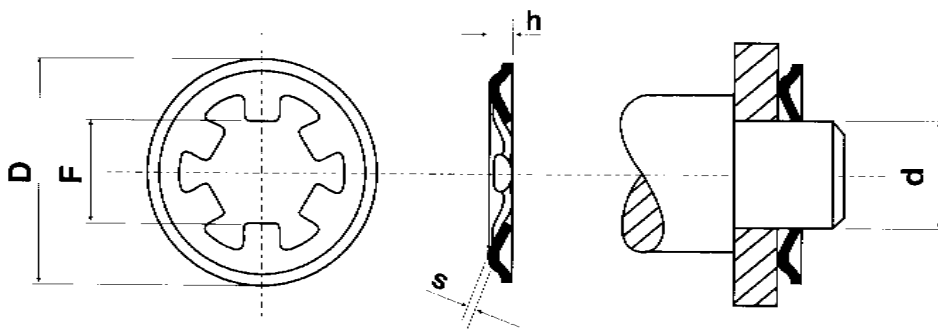
Hardness = HRc 42 - 52

Ordering Example:

DS 8 A = DIN 2093A Spring Washer
DS 8 B = DIN 2093B Spring Washer

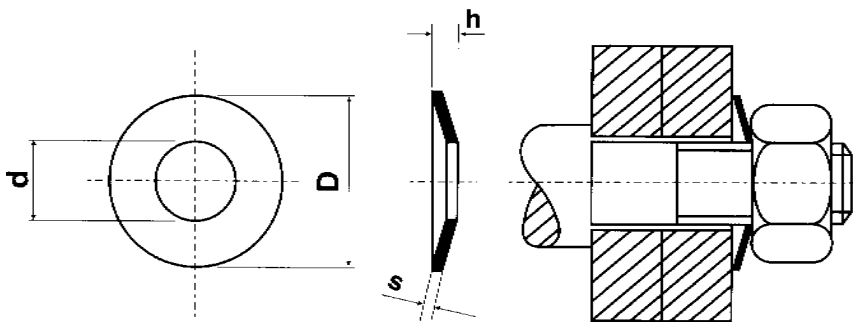


Metric Push-On Washers



Part No.	For Shaft Ø d mm	D h 16	F	h	S	Teeth	Weight kg/ 1000
PO 2	2	7.00	1.80	0.70	0.25	3	0.054
PO 2.5	2.5	8.50	2.25	0.70	0.25	3	0.082
PO 3	3	9.50	2.70	0.70	0.25	4	0.106
PO 4	4	10	3.65	0.75	0.3	5	0.131
PO 5	5	11	4.65	0.75	0.3	6	0.149
PO 6	6	12.50	5.65	0.90	0.4	6	0.241
PO 7	7	14	6.60	0.90	0.4	6	0.283
PO 8	8	15.50	7.60	0.90	0.4	8	0.352
PO 9	9	17	8.55	1	0.4	8	0.421
PO 10	10	18.50	9.55	1	0.4	8	0.466

Metric Spring Washers

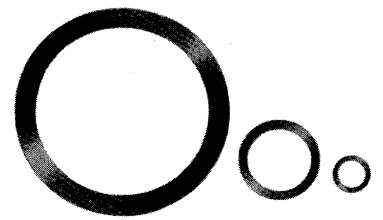


Part No.	For Screw Ø mm	d H 13	D h 14	h min	h max	S	Weight kg/ 1000
TW 3	3	3.2	8	0.75	1.05	0.5	0.160
TW 4	4	4.2	10	0.90	1.20	0.6	0.287
TW 5	5	5.2	12	1.10	1.50	0.8	0.540
TW 6	6	6.2	14	1.20	1.60	0.9	0.804
TW 8	8	8.2	18	1.50	1.90	1	1.490
TW 10	10	10.2	22	1.95	2.45	1.25	2.790
TW 12	12	12.2	28	2.20	2.70	1.5	5.610
TW 14	14	14.2	28	2.30	2.80	1.5	5.134
TW 16	16	16.3	34	2.55	3.05	1.75	9.330
TW 18	18	18.3	40	2.90	3.40	2	15.310
TW 20	20	20.3	40	3.00	3.50	2	13.950
TW 22	22	22.4	45	3.35	3.95	2.25	20.610
TW 24	24	24.4	45	3.45	4.05	2.25	19.100
TW 27	27	27.5	52	3.80	4.40	2.50	29.100
TW 30	30	30.5	58	4.10	4.70	2.80	41.540

Hardness = HRc 46 - 53

Metric Shim Washers

DIN 988



Material Steel ST 2 K 60, Bright, Oil Dipped

Thickness (mm)									
0.1	0.15	0.2	0.25	0.3	0.5	1	1.2	1.5	2
3x6	8x14	3x6	5x10	3x6	3x6	3x6	13x19	20x28	30x42
4x8	10x16	4x8	8x14	4x8	4x8	4x8	15x21	22x30	32x45
5x10	12x18	5x10	10x16	5x10	5x10	5x10	15x22	22x32	35x45
6x12	13x19	6x12	11x17	6x12	6x12	6x12	16x22	25x35	36x45
7x13	14x20	7x13	12x18	7x13	7x13	7x13	17x24	25x36	37x47
8x14	16x22	8x14	14x20	8x14	8x14	8x14	18x25	26x37	40x50
9x15	17x24	9x15	15x22	9x15	9x15	9x15	19x26	28x40	42x52
10x16	18x25	10x16	16x22	10x16	10x16	10x16	20x28	30x42	45x55
11x17	19x26	11x17	17x24	11x17	11x17	11x17	22x30	32x45	45x56
12x18	20x28	12x18	18x25	12x18	12x18	12x18	22x32	35x45	50x62
13x19	22x30	13x19	19x26	13x19	13x19	13x19	25x35	36x45	50x63
14x20	25x35	14x20	20x28	14x20	14x20	14x20	28x40	37x47	52x65
15x21	26x37	15x21	22x32	15x21	15x21	15x21	30x42	40x50	55x68
15x22	28x40	15x22	25x35	15x22	15x22	15x22	32x45	42x52	56x70
16x22	30x42	16x22	25x36	16x22	16x22	16x22	35x45	45x55	56x72
17x24	35x45	17x24	26x37	17x24	17x24	17x24	37x47	45x56	60x75
18x25	37x47	18x25	28x40	18x25	18x25	18x25	40x50	50x62	63x80
19x26	40x50	19x26	30x42	19x26	19x26	19x26	42x52	50x63	65x85
20x28	42x52	20x28	32x45	20x28	20x28	20x28	45x55	52x65	70x90
22x30	45x55	22x30	35x45	22x30	22x30	22x30	50x62	55x68	75x95
22x32	50x62	22x32	36x45	22x32	22x32	22x32	60x75	56x70	80x100
25x35	55x68	25x35	40x50	25x35	25x35	25x35	80x100	56x72	90x110
25x36	56x72	25x36	45x55	25x36	25x36	25x36		60x75	95x115
26x37	60x75	26x37	50x62	26x37	26x37	26x37		63x80	
28x40	63x80	28x40	55x68	28x40	28x40	28x40		65x85	
30x42	65x85	30x42	56x72	30x42	30x42	30x42		70x90	
32x45	70x90	32x45	60x75	32x45	32x45	32x45		75x95	
35x45	75x95	35x45	65x85	35x45	35x45	35x45		80x100	
36x45	80x100	36x45	70x90	36x45	36x45	36x45		90x110	
37x47	90x110	37x47	75x95	37x47	37x47	37x47		100x120	
40x50	95x115	40x50	100x120	40x50	40x50	40x50			
42x52	100x120	42x52	105x130	42x52	42x52	42x52			
45x55	110x140	45x55		45x55	45x55	45x55			
45x56	120x150	45x56		45x56	45x56	45x56			
48x60		48x60		48x60	48x60	48x60			
50x62		50x62		50x62	50x62	50x62			
50x63		50x63		50x63	50x63	50x63			
52x65		52x65		52x65	52x65	52x65			
55x68		55x68		55x68	55x68	55x68			
56x70		56x70		56x70	56x70	56x70			
56x72		56x72		56x72	56x72	56x72			
60x75		60x75		60x75	60x75	60x75			
63x80		63x80		63x80	63x80	63x80			
65x85		65x85		65x85	65x85	65x85			
70x90		70x90		70x90	70x90	70x90			
75x95		75x95		75x95	75x95	75x95			
80x100		80x100		80x100	80x100	80x100			
85x105		85x105		85x105	85x105	85x105			
90x110		90x110		90x110	90x110	90x110			
95x115		95x115		95x115	95x115	95x115			
100x120		100x120		100x120	100x120	100x120			
100x125		100x125		100x125	100x125	100x125			
105x130		105x130		105x130	105x130	105x130			
110x140		110x140		110x140	110x140	110x140			
120x150		120x150		120x150	120x150	120x150			
130x160		130x160		130x160	130x160	130x160			
140x170		140x170		140x170	140x170	140x170			
150x180		150x180		150x180	150x180	150x180			
160x190		160x190		160x190	160x190	160x190			
170x200		170x200		170x200	170x200	170x200			

Ordering Example:

PS3x6x0.1

PS Shim Washers

3..... Inside Diameter

6..... Outside Diameter

0.1..... Thickness

