

International Springs Ltd.



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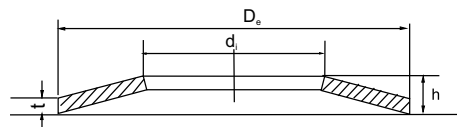
BW metric & BI imperial sizes

Standard Applications of Belleville washers

- Bus Bar in Transformers
- Bolting Application to avoid loosening
- Automobile & Heavy construction & Farm / Tractor equipment
- Mining & Turbine construction

for HEAVY BOLTED SECTIONS

Disc and Belleville Inc. Stocks Belleville Washer in Imperial as well as Metric sizes. Belleville Washers also called Conical Spring Washers are made as per DIN 6796 and are designed specifically for Heavy Duty Bolted section such as Bus Bars, Transformers, Rectifiers, Heat Exchangers, Transmission etc. These washers are intended to counteract the effect of setting which results in bolt/nut assemblies working loose. They do not effectively prevent loosening of the assembly under varying radial load and are designed for use with short bolts predominantly subject to thrust.



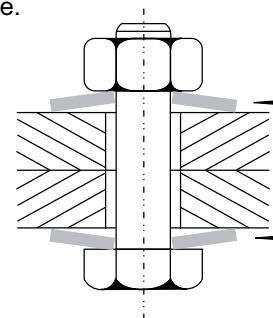
Belleville Washer are high stressed components and cannot be used for dynamic loading and infrequent varying load applications. The force given in the table below is approximate.

These Belleville Washer are made from various Carbon Steel grades. Chrome-Vanadium Steel, Stainless Steel etc.

Quality and Testing Disc and Belleville Inc. Belleville Washer are tested as per DIN 6796 and DIN 267 Part 26. Most thicker sizes are supplied in phosphated & oiled condition

Disc and Belleville Inc. has ready stock of all standard size of Belleville Washers in Spring Steel material. Other materials are also available on request.

Checkout our website for entire range of products



Heavy Duty Belleville Washers As per DIN 6796 (Metric Sizes)

Part No.	Dimensions									Load Flat (N)	Nominal Bolt Size
	in inches				in mm						
	D _s	d _i	t	h (min)	D _s	d _i	t	h max	h min		
BW-052204	0.197	0.09	0.016	0.020	5	2.2	0.4	0.60	0.50	625	M 2
BW-062705	0.236	0.11	0.020	0.024	6	2.7	0.5	0.72	0.61	945	M 2.5
BW-073206	0.276	0.13	0.024	0.028	7	3.2	0.6	0.85	0.72	1320	M 3
BW-083708	0.315	0.15	0.031	0.036	8	3.7	0.8	1.06	0.92	2410	M 3.5
BW-094310	0.354	0.17	0.039	0.044	9	4.3	1.0	1.30	1.12	3770	M 4
BW-115312	0.433	0.21	0.047	0.053	11	5.3	1.2	1.55	1.35	4580	M 5
BW-146415	0.551	0.25	0.059	0.067	14	6.4	1.5	2.00	1.70	8590	M 6
BW-177417	0.669	0.29	0.069	0.079	17	7.4	1.75	2.30	2.00	11300	M 7
BW-188420	0.709	0.33	0.079	0.088	18	8.4	2.0	2.60	2.24	14900	M 8
BW-231025	0.906	0.41	0.098	0.110	23	10.5	2.5	3.20	2.80	22100	M 10
BW-291330	1.142	0.51	0.118	0.135	29	13	3.0	3.95	3.43	34100	M 12
BW-351535	1.378	0.59	0.138	0.159	35	15	3.5	4.65	4.04	46000	M 14
BW-391740	1.535	0.67	0.157	0.180	39	17	4.0	5.25	4.58	59700	M 16
BW-421945	1.654	0.75	0.177	0.200	42	19	4.5	5.80	5.08	74400	M 18
BW-452150	1.772	0.83	0.197	0.220	45	21	5.0	6.40	5.60	93200	M 20
BW-492355	1.929	0.91	0.217	0.242	49	23	5.5	7.05	6.15	113700	M 22
BW-562560	2.205	0.98	0.236	0.267	56	25	6.0	7.75	6.77	131000	M 24
BW-602865	2.362	1.10	0.256	0.287	60	28	6.5	8.35	7.30	154000	M 27
BW-703170	2.756	1.22	0.276	0.315	70	31	7.0	9.20	8.00	172000	M 30

Belleville Washers for Heavy Bolted Sections (Imperial Sizes)

Part No.	Dimensions										Load Flat (N)	Nominal Bolt Size
	in inches					in mm						
	D _e	d _i	t	h (max)	h (min)	D _e	d _i	t	h (max)	h (min)		
BI-052203	0.197	0.087	0.012	0.020	0.016	5.00	2.20	0.30	0.50	0.40	289.80	-
BI-062704	0.236	0.106	0.016	0.026	0.020	6.00	2.70	0.40	0.66	0.50	651.00	-
BI-073205	0.276	0.126	0.020	0.030	0.025	7.00	3.20	0.50	0.76	0.64	936.40	1/8"#5
BI-083705	0.315	0.146	0.020	0.031	0.027	8.00	3.70	0.50	0.80	0.70	784.80	#6
BI-094308	0.354	0.169	0.031	0.043	0.037	9.00	4.30	0.80	1.10	0.95	2630.90	5/32" #8
BI-115310	0.433	0.209	0.039	0.055	0.047	11.00	5.30	1.00	1.40	1.20	4771.20	3/16" #10
BI-146412	0.551	0.252	0.050	0.067	0.056	14.00	6.40	1.20	1.70	1.42	6198.10	1/4"
BI-177415	0.669	0.291	0.059	0.079	0.070	17.00	7.40	1.50	2.00	1.80	8026.40	-
BI-188420	0.709	0.331	0.078	0.102	0.088	18.01	8.40	2.00	2.59	2.24	21203.00	5/16"
BI-218425	0.827	0.331	0.098	0.118	0.108	21.00	8.40	2.50	3.00	2.74	23833.80	5/16"
BI-231020	0.906	0.413	0.078	0.106	0.094	23.00	10.50	2.00	2.69	2.39	14269.10	3/8"
BI-241030	0.945	0.413	0.118	0.146	0.130	24.00	10.50	3.00	3.71	3.30	35672.70	3/8"
BI-291325	1.142	0.512	0.098	0.130	0.116	29.00	13.00	2.50	3.30	3.00	20957.70	1/2"
BI-321335	1.260	0.512	0.138	0.169	0.156	32.00	13.00	3.50	4.30	4.00	44145.00	1/2"
BI-351530	1.378	0.591	0.125	0.157	0.141	35.00	15.00	3.00	4.00	3.60	28984.10	9/16"
BI-391540	1.535	0.591	0.157	0.197	0.181	39.00	15.00	4.00	5.00	4.60	53509.10	9/16"
BI-391735	1.535	0.669	0.138	0.185	0.162	39.00	17.00	3.50	4.70	4.10	44590.90	5/8"
BI-421740	1.654	0.669	0.157	0.204	0.201	42.00	17.00	4.00	5.20	5.10	57968.20	5/8"
BI-471950	1.850	0.748	0.197	0.244	0.222	47.00	19.00	5.00	6.20	5.64	89181.80	-
BI-522160	2.047	0.827	0.236	0.287	0.246	52.00	21.00	6.00	7.20	6.25	138231.80	3/4"
BI-702870	2.756	1.102	0.276	0.362	0.317	70.00	28.00	7.00	9.20	8.05	205118.20	1"

For Bolt - Inch Sizes

DI Series

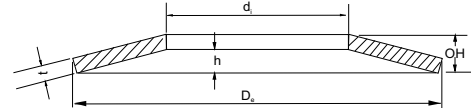
Steel & Stainless Steel



DISC SPRING-for BOLTS

Materials available : Springs Steel, Stainless Steel and 17 - 7 PH.

Series DI Pre-stressed Disc Springs are used to maintain load or tension in bolted assemblies. Pressure begins at the outer radius and flattens gradually toward the bolt as deflection progresses. Disc Springs exerts uniform pressure that remains constant inspite of tension losses caused by thermal expansion and contraction, compression set, or wear of parts. Because pressures are predictable, disc springs provide a simple and effective means of determining bolt tension that is far more accurate than "Torque" readings.



Load Values for Stainless Steel approx 95% of Spring Steel values shown.

Part No.	Nom. Bolt or Shaft Size	Dimensions										Load in Flat(N) P	Deflec- tion(in) f	Load in Flat(N) P(max)	Deflec- tion(in) f(max)
		Inches					mm								
		D _e	d _i	t	h	O.H	D _e	d _i	t	h	O.H				
DI-040202	#2	0.187	0.093	0.007	0.006	0.013	4.80	2.40	0.20	0.20	0.30	44.60	0.005	53.50	0.006
DI-040203	#2	0.187	0.093	0.010	0.005	0.015	4.80	2.40	0.30	0.10	0.40	53.50	0.004	129.30	0.005
DI-060302	#4	0.250	0.125	0.009	0.008	0.017	6.40	3.20	0.20	0.20	0.40	71.40	0.006	84.70	0.008
DI-060303	#4	0.250	0.125	0.013	0.007	0.020	6.40	3.20	0.30	0.20	0.50	173.90	0.005	222.90	0.007
DI-070304	#6	0.281	0.138	0.015	0.008	0.023	7.10	3.50	0.40	0.20	0.60	240.80	0.006	307.70	0.008
DI-080403	5/32"	0.312	0.156	0.011	0.011	0.022	8.00	4.00	0.30	0.30	0.60	115.90	0.008	133.80	0.011
DI-080404	#6	0.312	0.156	0.017	0.008	0.025	8.00	4.00	0.40	0.20	0.60	280.90	0.006	365.70	0.008
DI-080405	#8	0.343	0.164	0.019	0.009	0.028	8.70	4.20	0.50	0.20	0.70	256.70	0.007	463.80	0.009
DI-090404	3/16"	0.375	0.195	0.015	0.012	0.027	9.50	4.90	0.40	0.30	0.70	218.50	0.009	264.00	0.012
DI-120605	1/4"	0.500	0.258	0.019	0.016	0.035	12.70	6.60	0.50	0.40	0.90	334.40	0.012	396.90	0.016
DI-120606	1/4"	0.500	0.258	0.023	0.016	0.039	12.70	6.60	0.60	0.40	1.00	579.70	0.012	713.50	0.016
DI-150808	5/16"	0.625	0.317	0.032	0.016	0.048	15.90	8.00	0.80	0.40	1.20	949.80	0.012	1217.30	0.016
DI-190807	5/16"	0.750	0.320	0.028	0.024	0.052	19.00	8.10	0.70	0.60	1.30	651.00	0.018	775.90	0.024
DI-190808	5/16"	0.750	0.320	0.032	0.024	0.056	19.00	8.10	0.80	0.60	1.40	949.80	0.018	1163.80	0.024
DI-170906	3/8"	0.688	0.382	0.024	0.020	0.044	17.50	9.70	0.60	0.50	1.10	463.70	0.015	557.40	0.020
DI-170907	3/8"	0.688	0.382	0.028	0.020	0.048	17.50	9.70	0.70	0.50	1.20	722.40	0.015	891.80	0.020
DI-190908	3/8"	0.750	0.382	0.032	0.020	0.052	19.00	9.70	0.80	0.50	1.30	838.30	0.015	1052.40	0.020
DI-190909	3/8"	0.750	0.382	0.035	0.022	0.057	19.00	9.70	0.90	0.60	1.40	1212.90	0.017	1525.00	0.022
DI-190910	3/8"	0.750	0.382	0.040	0.019	0.059	19.00	9.70	1.00	0.50	1.50	1529.50	0.014	1966.50	0.019
DI-251109	7/16"	1.000	0.445	0.035	0.032	0.067	25.40	11.30	0.90	0.80	1.70	976.50	0.024	1150.50	0.032

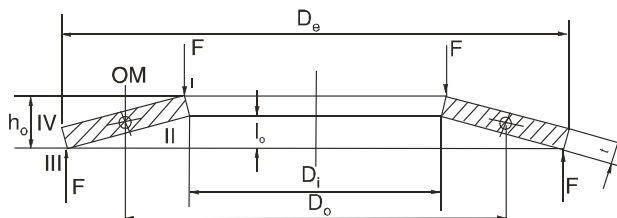
Part No.	Nom. Bolt or Shaft Size	Dimensions										Load in Flat(N) P	Deflec- tion(in) f	Load in Flat(N) P(max)	Deflec- tion(in) f(max)
		Inches					mm								
		D _e	d _i	t	h	O.H	D _e	d _i	t	h	O.H				
DI-251110	7/16"	1.000	0.445	0.039	0.032	0.071	25.40	11.30	1.00	0.80	1.80	1328.80	0.024	1600.80	0.032
DI-251112	7/16"	1.000	0.445	0.049	0.026	0.075	25.40	11.30	1.20	0.70	1.90	2028.90	0.020	2586.30	0.026
DI-251309	1/2"	1.000	0.512	0.035	0.032	0.067	25.40	13.00	0.90	0.80	1.70	1052.30	0.024	1235.20	0.032
DI-271310	1/2"	1.100	0.512	0.039	0.036	0.075	27.90	13.00	1.00	0.90	1.90	1288.70	0.027	1511.60	0.036
DI-271312	1/2"	1.100	0.512	0.049	0.003	0.083	27.90	13.00	1.20	0.80	2.10	2305.40	0.025	2853.20	0.034
DI-271315	1/2"	1.100	0.512	0.059	0.028	0.087	27.90	13.00	1.50	0.70	2.20	3197.20	0.021	4115.70	0.028
DI-281414	9/16"	1.125	0.567	0.056	0.028	0.084	28.60	14.40	1.40	0.70	2.10	2729.00	0.021	3495.90	0.028
DI-311610	5/8"	1.250	0.630	0.040	0.042	0.082	31.80	16.00	1.00	1.10	2.10	1351.10	0.031	1533.90	0.042
DI-311616	5/8"	1.250	0.630	0.062	0.030	0.092	31.80	16.00	1.60	0.80	2.30	3197.20	0.022	4111.30	0.030
DI-341612	5/8"	1.375	0.637	0.049	0.046	0.095	34.90	16.20	1.20	1.20	2.40	2091.30	0.034	2448.00	0.046
DI-341615	5/8"	1.375	0.637	0.059	0.043	0.102	34.90	16.20	1.50	1.10	2.60	3268.50	0.032	4017.60	0.043
DI-341620	5/8"	1.375	0.637	0.078	0.032	0.110	34.90	16.20	2.00	0.80	2.80	5342.00	0.024	6938.40	0.032
DI-381911	3/4"	1.500	0.755	0.045	0.048	0.093	38.10	19.20	1.10	1.20	2.40	1525.00	0.036	1721.20	0.048
DI-381918	3/4"	1.500	0.755	0.072	0.037	0.109	38.10	19.20	1.80	0.90	2.80	5303.00	0.028	5507.00	0.037
DI-381915	3/4"	1.500	0.761	0.059	0.055	0.114	38.10	19.30	1.50	1.40	2.90	3883.90	0.041	4543.80	0.055
DI-381920	3/4"	1.500	0.761	0.078	0.044	0.122	38.10	19.30	2.00	1.10	3.10	6666.30	0.033	8458.90	0.044
DI-381925	3/4"	1.500	0.761	0.098	0.036	0.134	38.10	19.30	2.50	0.90	3.40	10581.00	0.027	13810.00	0.036
DI-442222	7/8"	1.750	0.880	0.085	0.043	0.128	44.40	22.30	2.20	1.10	3.30	6037.60	0.032	7736.50	0.043
DI-502217	1"	2.000	0.880	0.065	0.065	0.130	50.80	22.30	1.70	1.70	3.30	3469.20	0.049	3990.00	0.065
DI-502520	1"	2.000	1.016	0.078	0.060	0.138	50.80	25.80	2.00	1.50	3.50	5252.80	0.045	6403.30	0.060
DI-502525	1"	2.000	1.016	0.098	0.060	0.158	50.80	25.80	2.50	1.50	4.00	10211.00	0.045	12847.00	0.060
DI-502530	1"	2.000	1.016	0.118	0.047	0.165	50.80	25.80	3.00	1.20	4.20	13524.00	0.035	17587.00	0.047
DI-602520	1"	2.375	1.016	0.078	0.079	0.157	60.30	25.80	2.00	2.00	4.00	4784.60	0.059	5489.10	0.079
DI-602525	1"	2.375	1.016	0.098	0.079	0.177	60.30	25.80	2.50	2.00	4.50	6087.60	0.059	10983.00	0.079
DI-602530	1"	2.375	1.016	0.118	0.063	0.181	60.30	25.80	3.00	1.60	4.60	12008.00	0.047	15313.00	0.063
DI-633120	1.1/4"	2.500	1.250	0.080	0.080	0.160	63.50	31.80	2.00	2.00	4.60	5043.30	0.060	5801.30	0.080
DI-633131	1.1/4"	2.500	1.250	0.120	0.060	0.180	63.50	31.80	3.10	1.50	4.60	11554.00	0.045	14813.00	0.080

DS Series Precision Metric Disc Springs

GROUP CLASSIFICATION OF DISC SPRING

In accordance with DIN 2093 Standard,
Disc Springs are classified into 3 groups as given in the table:

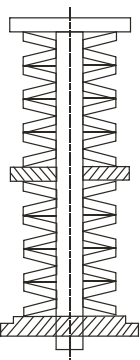
Group	Thickness of single disc in mm
1	Less than 1.25
2	From 1.25 to 6
3	Over 6 upto 14



INTRODUCTION

Disc Springs are conically formed annular discs, which are loaded in the axial direction. Disc Springs offer a well-developed solution to many engineering problems through a unique combination of high force in a small space. Disc Springs can be used as single disc or arranged in stacks. A spring stack can consist of either single springs or parallel spring sets. Disc Springs are available with or without contact flats. Disc Springs conform to DIN 2093. Heavy series Disc Springs are manufactured from forgings. We have computerized design program to assist our customers for their specific applications. Disc Springs are mainly manufactured from Spring Steel material.

Our Disc Springs are AUSTEMPERED. This method of heat treatment is particularly effective for springs, as it gives the maximum toughness and therefore considerable durability.



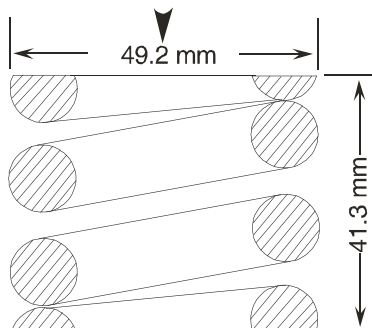
STACK LENGTH

When stacking Disc Springs, effort should be made to keep the stacks as short as possible. Friction and other influences make a stack more uneven. It influences more on the side of the loading. This effect usually can be neglected for a "normal" spring stack, but not for long stacks. If it is longer, the stack can be stabilized by dividing it with guide washers, which as a rule of thumb should have a thickness of at least one and a half times the guide diameter.

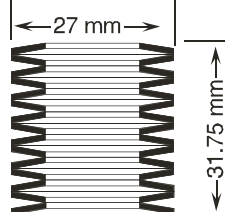
DISC SPRING STACK COMPARED TO HELICAL SPRING.

Note that the same load can be achieved at substantial reduction in space, Disc Stacks may be designed for extremely high loads where coil springs are not feasible at all.

Coil Spring weight : 0.26kg
Volume : 78.5cm³
Load : 409kg.



Disc Spring weight : 0.8kg
Volume : 18.2cm³
Load : 409kg.



ADVANTAGES OF DISC SPRINGS

- 1) No Deformation of Fatigue under normal loads.
- 2) High Energy Storage Capacity.
- 3) Long Service Life.
- 4) Stock keeping is minimized as the individual spring sizes can be combined universally.
- 5) Space saving.
- 6) Largely Self-damping, giving good shock absorption and energy dissipation.
- 7) Efficient use of space and high spring force with small deflections.
- 8) Adaptable to stacking in numerous configurations, Thus having modular spring element.
- 9) Low cost & Greater Security.

DISC SPRINGS IN SERIES & PARALLEL COMBINATIONS.

STACKED IN PARALLEL :



Total Deflection	=	Deflection 1 disc
Total Load	=	Load on 1 disc X no. of discs.

STACKED IN SERIES :



Total Deflection	=	Deflection of 1 disc X No. of discs in stack.
Total Load	=	Load on 1 disc.

STACKED IN PARALLEL SERIES :



COMBINATIONS can be designed to accommodate virtually any load or deflection and to obtain progressive or regressive characteristics.

Precision Metric Disc Springs

IIS Part No.	Dimensions						Dimensions					Characteristic Values			
	D _o (in)	d _i (in)	t (in)	h _o (in)	t' (in)	Group	D _o (mm)	d _i (mm)	t (mm)	h _o (mm)	t' (mm)	F (N)	s (mm)	F (N)	s (mm)
DS-060303	0.24	0.13	0.01	0.02	-	1	6.0	3.2	0.30	0.45	-	84	0.075	117	0.110
DS-080302	0.31	0.13	0.01	0.02	-	1	8.0	3.2	0.20	0.40	-	20	0.100	26	0.150
DS-080303	0.31	0.13	0.01	0.02	-	1	8.0	3.2	0.30	0.55	-	79	0.125	105	0.190
DS-080304	0.31	0.13	0.02	0.02	-	1	8.0	3.2	0.40	0.60	-	130	0.100	186	0.150
DS-080305	0.31	0.13	0.02	0.03	-	1	8.0	3.2	0.50	0.70	-	246	0.100	357	0.150
DS-080402	C 0.31	0.17	0.01	0.02	-	1	8.0	4.2	0.20	0.45	-	33	0.125	39	0.190
DS-080403	B 0.31	0.17	0.01	0.02	-	1	8.0	4.2	0.30	0.55	-	89	0.125	119	0.190
DS-080404	A 0.31	0.17	0.02	0.02	-	1	8.0	4.2	0.40	0.60	-	147	0.100	210	0.150
DS-100303	0.39	0.13	0.01	0.03	-	1	10.0	3.2	0.30	0.65	-	82	0.175	98	0.260
DS-100304	0.39	0.13	0.02	0.03	-	1	10.0	3.2	0.40	0.70	-	133	0.150	182	0.230
DS-100305	0.39	0.13	0.02	0.03	-	1	10.0	3.2	0.50	0.75	-	195	0.125	282	0.190
DS-100404	0.39	0.17	0.02	0.03	-	1	10.0	4.2	0.40	0.70	-	140	0.150	192	0.230
DS-100405	0.39	0.17	0.02	0.03	-	1	10.0	4.2	0.50	0.75	-	206	0.125	297	0.190
DS-100406	0.39	0.17	0.02	0.03	-	1	10.0	4.2	0.60	0.85	-	360	0.125	508	0.190
DS-100502	C 0.39	0.20	0.01	0.02	-	1	10.0	5.2	0.25	0.55	-	48	0.150	58	0.230
DS-100504	B 0.39	0.20	0.02	0.03	-	1	10.0	5.2	0.40	0.70	-	155	0.150	213	0.230
DS-100505	A 0.39	0.20	0.02	0.03	-	1	10.0	5.2	0.50	0.75	-	228	0.125	329	0.190
DS-120404	0.47	0.17	0.02	0.03	-	1	12.0	4.2	0.40	0.80	-	141	0.200	178	0.300
DS-120405	0.47	0.17	0.02	0.03	-	1	12.0	4.2	0.50	0.85	-	208	0.175	282	0.260
DS-120406	0.47	0.17	0.02	0.04	-	1	12.0	4.2	0.60	1.00	-	405	0.200	557	0.300
DS-120505	0.47	0.20	0.02	0.04	-	1	12.0	5.2	0.50	0.90	-	263	0.200	350	0.300
DS-120506	0.47	0.20	0.02	0.04	-	1	12.0	5.2	0.60	0.95	-	361	0.175	502	0.260
DS-120605	0.47	0.24	0.02	0.03	-	1	12.0	6.2	0.50	0.85	-	239	0.175	324	0.260
DS-120606	0.47	0.24	0.02	0.04	-	1	12.0	6.2	0.60	0.95	-	394	0.175	547	0.260
DS-130505	0.49	0.20	0.02	0.03	-	1	12.5	5.2	0.50	0.85	-	200	0.175	270	0.260
DS-130603	C 0.49	0.24	0.01	0.03	-	1	12.5	6.2	0.35	0.80	-	130	0.225	152	0.340
DS-130605	B 0.49	0.24	0.02	0.03	-	1	12.5	6.2	0.50	0.85	-	215	0.175	291	0.260
DS-130607	A 0.49	0.24	0.03	0.04	-	1	12.5	6.2	0.70	1.00	-	457	0.150	673	0.230
DS-140703	C 0.55	0.28	0.01	0.03	-	1	14.0	7.2	0.35	0.80	-	106	0.225	123	0.340
DS-140705	B 0.55	0.28	0.02	0.04	-	1	14.0	7.2	0.50	0.90	-	210	0.200	279	0.300
DS-140708	A 0.55	0.28	0.03	0.04	-	1	14.0	7.2	0.80	1.10	-	547	0.150	813	0.230
DS-150504	0.59	0.20	0.02	0.04	-	1	15.0	5.2	0.40	0.95	-	154	0.275	175	0.410
DS-150505	0.59	0.20	0.02	0.04	-	1	15.0	5.2	0.50	1.00	-	221	0.250	280	0.380
DS-150506	0.59	0.20	0.02	0.04	-	1	15.0	5.2	0.60	1.05	-	302	0.225	409	0.340
DS-150507	0.59	0.20	0.03	0.04	-	1	15.0	5.2	0.70	1.10	-	395	0.200	555	0.300
DS-150605	0.59	0.24	0.02	0.04	-	1	15.0	6.2	0.50	1.00	-	229	0.250	291	0.380
DS-150606	0.59	0.24	0.02	0.04	-	1	15.0	6.2	0.60	1.05	-	314	0.225	426	0.340
DS-150607	0.59	0.24	0.03	0.04	-	1	15.0	6.2	0.70	1.10	-	411	0.200	578	0.300
DS-150807	0.59	0.32	0.03	0.04	-	1	15.0	8.2	0.70	1.10	-	474	0.200	666	0.300
DS-150808	0.59	0.32	0.03	0.05	-	1	15.0	8.2	0.80	1.20	-	689	0.200	982	0.300
DS-160804	C 0.63	0.32	0.02	0.04	-	1	16.0	8.2	0.40	0.90	-	131	0.250	155	0.380
DS-160806	B 0.63	0.32	0.02	0.04	-	1	16.0	8.2	0.60	1.05	-	304	0.225	412	0.340
DS-160807	0.63	0.32	0.03	0.05	-	1	16.0	8.2	0.70	1.15	-	461	0.225	641	0.340
DS-160808	0.63	0.32	0.03	0.05	-	1	16.0	8.2	0.80	1.20	-	579	0.200	825	0.300
DS-160809	A 0.63	0.32	0.04	0.05	-	1	16.0	8.2	0.90	1.25	-	697	0.175	1 004	0.260

Precision Metric Disc Springs

IIS Part No.	Dimensions						Dimensions					Characteristic Values			
	D _e (in)	d _i (in)	t (in)	h ₀ (in)	t' (in)	Group	D _e (mm)	d _i (mm)	t (mm)	h ₀ (mm)	t' (mm)	0.50h ₀		0.75h ₀	
												F (N)	s (mm)	F (N)	s (mm)
DS-180604	0.71	0.24	0.02	0.04	-	1	18.0	6.2	0.40	1.00	-	126	0.300	139	0.450
DS-180605	0.71	0.24	0.02	0.04	-	1	18.0	6.2	0.50	1.10	-	206	0.300	245	0.450
DS-180606	0.71	0.24	0.02	0.05	-	1	18.0	6.2	0.60	1.20	-	317	0.300	400	0.450
DS-180607	0.71	0.24	0.03	0.05	-	1	18.0	6.2	0.70	1.25	-	414	0.275	550	0.410
DS-180608	0.71	0.24	0.03	0.05	-	1	18.0	6.2	0.80	1.30	-	523	0.250	733	0.380
DS-180805	0.71	0.32	0.02	0.04	-	1	18.0	8.2	0.50	1.10	-	222	0.300	265	0.450
DS-180807	0.71	0.32	0.03	0.05	-	1	18.0	8.2	0.70	1.25	-	446	0.275	594	0.410
DS-180808	0.71	0.32	0.03	0.05	-	1	18.0	8.2	0.80	1.30	-	564	0.250	791	0.380
DS-180810	0.71	0.32	0.04	0.06	-	1	18.0	8.2	1.00	1.40	-	814	0.200	1 181	0.300
DS-180904	C 0.71	0.36	0.02	0.04	-	1	18.0	9.2	0.45	1.05	-	186	0.300	214	0.450
DS-180907	B 0.71	0.36	0.03	0.05	-	1	18.0	9.2	0.70	1.20	-	417	0.250	572	0.380
DS-180910	A 0.71	0.36	0.04	0.06	-	1	18.0	9.2	1.00	1.40	-	865	0.200	1 254	0.300
DS-200805	0.79	0.32	0.02	0.05	-	1	20.0	8.2	0.50	1.15	-	200	0.325	231	0.490
DS-200806	0.79	0.32	0.02	0.05	-	1	20.0	8.2	0.60	1.30	-	342	0.350	413	0.530
DS-200807	0.79	0.32	0.03	0.05	-	1	20.0	8.2	0.70	1.35	-	442	0.325	570	0.490
DS-200808	0.79	0.32	0.03	0.06	-	1	20.0	8.2	0.80	1.40	-	557	0.300	751	0.450
DS-200809	0.79	0.32	0.04	0.06	-	1	20.0	8.2	0.90	1.45	-	685	0.275	949	0.410
DS-200810	0.79	0.32	0.04	0.06	-	1	20.0	8.2	1.00	1.55	-	917	0.275	1 288	0.410
DS-201004	0.79	0.40	0.02	0.04	-	1	20.0	10.2	0.40	0.90	-	84	0.250	99	0.380
DS-201005	C 0.79	0.40	0.02	0.05	-	1	20.0	10.2	0.50	1.15	-	219	0.325	254	0.490
DS-201008	B 0.79	0.40	0.03	0.05	-	1	20.0	10.2	0.80	1.35	-	547	0.275	745	0.410
DS-201009	0.79	0.40	0.04	0.06	-	1	20.0	10.2	0.90	1.45	-	754	0.275	1 045	0.410
DS-201010	0.79	0.40	0.04	0.06	-	1	20.0	10.2	1.00	1.55	-	1 010	0.275	1 418	0.410
DS-201011	A 0.79	0.40	0.04	0.06	-	1	20.0	10.2	1.10	1.55	-	1 050	0.225	1 531	0.340
DS-201012	0.79	0.40	0.05	0.07	-	1	20.0	10.2	1.25	1.75	-	1 708	0.250	2 507	0.380
DS-201015	0.79	0.40	0.06	0.07	-	2	20.0	10.2	1.50	1.80	-	1 695	0.150	2 576	0.230
DS-221106	C 0.89	0.44	0.02	0.06	-	1	22.5	11.2	0.60	1.40	-	370	0.400	425	0.600
DS-221108	B 0.89	0.44	0.03	0.06	-	1	22.5	11.2	0.80	1.45	-	533	0.325	710	0.490
DS-221112	A 0.89	0.44	0.05	0.07	-	2	22.5	11.2	1.25	1.75	-	1 330	0.250	1 952	0.380
DS-230807	0.91	0.32	0.03	0.06	-	1	23.0	8.2	0.70	1.50	-	448	0.400	544	0.600
DS-230808	0.91	0.32	0.03	0.06	-	1	23.0	8.2	0.80	1.55	-	560	0.375	717	0.560
DS-230809	0.91	0.32	0.04	0.06	-	1	23.0	8.2	0.90	1.60	-	687	0.350	925	0.530
DS-230810	0.91	0.32	0.04	0.07	-	1	23.0	8.2	1.00	1.70	-	909	0.350	1 249	0.530
DS-231009	0.91	0.40	0.04	0.06	-	1	23.0	10.2	0.90	1.65	-	802	0.375	1 055	0.560
DS-231010	0.91	0.40	0.04	0.07	-	1	23.0	10.2	1.00	1.70	-	964	0.350	1 325	0.530
DS-231012	0.91	0.40	0.05	0.07	-	2	23.0	10.2	1.25	1.90	-	1 627	0.325	2 320	0.490
DS-231210	0.91	0.48	0.04	0.06	-	1	23.0	12.2	1.00	1.60	-	872	0.300	1 217	0.450
DS-231212	0.91	0.48	0.05	0.07	-	2	23.0	12.2	1.25	1.85	-	1 630	0.300	2 331	0.450
DS-231215	0.91	0.48	0.06	0.08	-	2	23.0	12.2	1.50	2.00	-	2 250	0.250	3 338	0.380
DS-251010	0.98	0.40	0.04	0.07	-	1	25.0	10.2	1.00	1.75	-	870	0.375	1 168	0.560
DS-251207	C 0.98	0.48	0.03	0.06	-	1	25.0	12.2	0.70	1.60	-	515	0.450	601	0.680
DS-251209	B 0.98	0.48	0.04	0.06	-	1	25.0	12.2	0.90	1.60	-	644	0.350	868	0.530
DS-251210	0.98	0.48	0.04	0.07	-	1	25.0	12.2	1.00	1.80	-	1 021	0.400	1 359	0.600
DS-251212	0.98	0.48	0.05	0.08	-	2	25.0	12.2	1.25	1.95	-	1 573	0.350	2 232	0.530
DS-251215	A 0.98	0.48	0.06	0.08	-	2	25.0	12.2	1.50	2.05	-	2 007	0.275	2 910	0.410
DS-281008	1.10	0.40	0.03	0.07	-	1	28.0	10.2	0.80	1.75	-	553	0.475	661	0.710
DS-281010	1.10	0.40	0.04	0.07	-	1	28.0	10.2	1.00	1.90	-	872	0.450	1 135	0.680
DS-281012	1.10	0.40	0.05	0.08	-	2	28.0	10.2	1.25	2.05	-	1 339	0.400	1 853	0.600
DS-281015	1.10	0.40	0.06	0.09	-	2	28.0	10.2	1.50	2.20	-	1 899	0.350	2 745	0.530

Precision Metric Disc Springs

IIS Part No.	Dimensions						Group	Dimensions					Characteristic Values			
	D _e (in)	d _i (in)	t (in)	h _o (in)	t' (in)	D _e (mm)		d _i (mm)	t (mm)	h _o (mm)	t' (mm)	0.50h _o		0.75h _o		
												F (N)	s (mm)	F (N)	s (mm)	
DS-281210	1.10	0.48	0.04	0.08	-	1	28.0	12.2	1.00	1.95	-	992	0.475	1 266	0.710	
DS-281212	1.10	0.48	0.05	0.08	-	2	28.0	12.2	1.25	2.10	-	1 519	0.425	2 089	0.640	
DS-281215	1.10	0.48	0.06	0.09	-	2	28.0	12.2	1.50	2.25	-	2 159	0.375	3 065	0.560	
DS-281408	C 1.10	0.56	0.03	0.07	-	1	28.0	14.2	0.80	1.80	-	681	0.500	801	0.750	
DS-281410	B 1.10	0.56	0.04	0.07	-	1	28.0	14.2	1.00	1.80	-	832	0.400	1 107	0.600	
DS-281412	1.10	0.56	0.05	0.08	-	2	28.0	14.2	1.25	2.10	-	1 634	0.425	2 246	0.640	
DS-281415	A 1.10	0.56	0.06	0.08	-	2	28.0	14.2	1.50	2.15	-	1 970	0.325	2 854	0.490	
DS-311210	1.24	0.48	0.04	0.08	-	1	31.5	12.2	1.00	2.10	-	951	0.550	1 170	0.830	
DS-311212	1.24	0.48	0.05	0.09	-	2	31.5	12.2	1.25	2.20	-	1 343	0.475	1 800	0.710	
DS-311215	1.24	0.48	0.06	0.09	-	2	31.5	12.2	1.50	2.35	-	1 912	0.425	2 697	0.640	
DS-311608	C 1.24	0.64	0.03	0.07	-	1	31.5	16.3	0.80	1.85	-	594	0.525	687	0.790	
DS-311612	B 1.24	0.64	0.05	0.08	-	2	31.5	16.3	1.25	2.15	-	1 409	0.450	1 923	0.680	
DS-311615	1.24	0.64	0.06	0.09	-	2	31.5	16.3	1.50	2.40	-	2 314	0.450	3 249	0.680	
DS-311617	A 1.24	0.64	0.07	0.10	-	2	31.5	16.3	1.75	2.45	-	2 669	0.350	3 905	0.530	
DS-311620	1.24	0.64	0.08	0.11	-	2	31.5	16.3	2.00	2.75	-	4 239	0.375	6 148	0.560	
DS-341210	1.34	0.48	0.04	0.09	-	1	34.0	12.3	1.00	2.25	-	998	0.625	1 175	0.940	
DS-341212	1.34	0.48	0.05	0.09	-	2	34.0	12.3	1.25	2.35	-	1 395	0.550	1 825	0.830	
DS-341215	1.34	0.48	0.06	0.10	-	2	34.0	12.3	1.50	2.50	-	1 982	0.500	2 725	0.750	
DS-341412	1.34	0.56	0.05	0.09	-	2	34.0	14.3	1.25	2.40	-	1 546	0.575	1 990	0.860	
DS-341415	1.34	0.56	0.06	0.10	-	2	34.0	14.3	1.50	2.55	-	2 192	0.525	2 997	0.790	
DS-341615	1.34	0.64	0.06	0.10	-	2	34.0	16.3	1.50	2.55	-	2 313	0.525	3 163	0.790	
DS-341620	1.34	0.64	0.08	0.11	-	2	34.0	16.3	2.00	2.85	-	4 003	0.425	5 803	0.640	
DS-351809	C 1.40	0.72	0.04	0.08	-	1	35.5	18.3	0.90	2.05	-	712	0.575	831	0.860	
DS-351812	B 1.40	0.72	0.05	0.09	-	2	35.5	18.3	1.25	2.25	-	1 277	0.500	1 699	0.750	
DS-351820	A 1.40	0.72	0.08	0.11	-	2	35.5	18.3	2.00	2.80	-	3 576	0.400	5 187	0.600	
DS-401412	1.57	0.56	0.05	0.10	-	2	40.0	14.3	1.25	2.65	-	1 459	0.700	1 780	1.050	
DS-401415	1.57	0.56	0.06	0.11	-	2	40.0	14.3	1.50	2.75	-	1 929	0.625	2 550	0.940	
DS-401420	1.57	0.56	0.08	0.12	-	2	40.0	14.3	2.00	3.05	-	3 363	0.525	4 781	0.790	
DS-401615	1.57	0.64	0.06	0.11	-	2	40.0	16.3	1.50	2.80	-	2 102	0.650	2 758	0.980	
DS-401620	1.57	0.64	0.08	0.12	-	2	40.0	16.3	2.00	3.10	-	3 663	0.550	5 195	0.830	
DS-401820	1.57	0.72	0.08	0.12	-	2	40.0	18.3	2.00	3.15	-	4 030	0.575	5 642	0.860	
DS-402010	C 1.57	0.80	0.04	0.09	-	1	40.0	20.4	1.00	2.30	-	876	0.650	1 018	0.980	
DS-402015	B 1.57	0.80	0.06	0.10	-	2	40.0	20.4	1.50	2.65	-	1 953	0.575	2 616	0.860	
DS-402020	1.57	0.80	0.08	0.12	-	2	40.0	20.4	2.00	3.10	-	4 041	0.550	5 730	0.830	
DS-402022	A 1.57	0.80	0.09	0.12	-	2	40.0	20.4	2.25	3.15	-	4 481	0.450	6 544	0.680	
DS-402025	1.57	0.80	0.10	0.14	-	2	40.0	20.4	2.50	3.45	-	6 453	0.475	9 359	0.710	
DS-452212	C 1.77	0.88	0.05	0.11	-	2	45.0	22.4	1.25	2.85	-	1 620	0.800	1 891	1.200	
DS-452217	B 1.77	0.88	0.07	0.12	-	2	45.0	22.4	1.75	3.05	-	2 701	0.650	3 659	0.980	
DS-452225	A 1.77	0.88	0.10	0.14	-	2	45.0	22.4	2.50	3.50	-	5 320	0.500	7 716	0.750	
DS-501812	1.97	0.72	0.05	0.11	-	2	50.0	18.4	1.25	2.85	-	1 178	0.800	1 375	1.200	
DS-501815	1.97	0.72	0.06	0.13	-	2	50.0	18.4	1.50	3.30	-	2 184	0.900	2 606	1.350	
DS-501820	1.97	0.72	0.08	0.14	-	2	50.0	18.4	2.00	3.50	-	3 392	0.750	4 586	1.130	
DS-501825	1.97	0.72	0.10	0.16	-	2	50.0	18.4	2.50	4.10	-	6 733	0.800	9 315	1.200	
DS-501830	1.97	0.72	0.12	0.17	-	2	50.0	18.4	3.00	4.40	-	9 546	0.700	13 688	1.050	
DS-502020	1.97	0.80	0.08	0.14	-	2	50.0	20.4	2.00	3.50	-	3 478	0.750	4 702	1.130	
DS-502025	1.97	0.80	0.10	0.15	-	2	50.0	20.4	2.50	3.85	-	5 601	0.675	7 902	1.010	
DS-502220	1.97	0.88	0.08	0.14	-	2	50.0	22.4	2.00	3.60	-	3 924	0.800	5 222	1.200	
DS-502225	1.97	0.88	0.10	0.15	-	2	50.0	22.4	2.50	3.90	-	6 044	0.700	8 510	1.050	

Precision Metric Disc Springs

IIS Part No.		Dimensions					Group	Dimensions					Characteristic Values			
		D _e (in)	d _i (in)	t (in)	h _o (in)	t' (in)		D _e (mm)	d _i (mm)	t (mm)	h _o (mm)	t' (mm)	0.50h _o		0.75h _o	
DS-502512	C	1.97	1.00	0.05	0.11	-	2	50.0	25.4	1.25	2.85	-	1 328	0.800	1 550	1.200
DS-502515		1.97	1.00	0.06	0.12	-	2	50.0	25.4	1.50	3.10	-	2 028	0.800	2 512	1.200
DS-502520	B	1.97	1.00	0.08	0.13	-	2	50.0	25.4	2.00	3.40	-	3 491	0.700	4 762	1.050
DS-502522		1.97	1.00	0.09	0.15	-	2	50.0	25.4	2.25	3.75	-	5 249	0.750	7 241	1.130
DS-502525		1.97	1.00	0.10	0.15	-	2	50.0	25.4	2.50	3.90	-	6 437	0.700	9 063	1.050
DS-502530	A	1.97	1.00	0.12	0.16	-	2	50.0	25.4	3.00	4.10	-	8 214	0.550	12 044	0.830
DS-562815	C	2.20	1.12	0.06	0.14	-	2	56.0	28.5	1.50	3.45	-	2 259	0.975	2 621	1.460
DS-562820	B	2.20	1.12	0.08	0.14	-	2	56.0	28.5	2.00	3.60	-	3 335	0.800	4 438	1.200
DS-562825		2.20	1.12	0.10	0.17	-	2	56.0	28.5	2.50	4.20	-	6 550	0.850	9 004	1.280
DS-562830	A	2.20	1.12	0.12	0.17	-	2	56.0	28.5	3.00	4.30	-	7 895	0.650	11 441	0.980
DS-602020		2.36	0.81	0.08	0.16	-	2	60.0	20.5	2.00	4.10	-	3 802	1.050	4 737	1.580
DS-602025		2.36	0.81	0.10	0.17	-	2	60.0	20.5	2.50	4.30	-	5 379	0.900	7 302	1.350
DS-602030		2.36	0.81	0.12	0.19	-	2	60.0	20.5	3.00	4.70	-	8 234	0.850	11 615	1.280
DS-602525		2.36	1.00	0.10	0.17	-	2	60.0	25.5	2.50	4.40	-	6 081	0.950	8 195	1.430
DS-602530		2.36	1.00	0.12	0.18	-	2	60.0	25.5	3.00	4.65	-	8 352	0.825	11 803	1.240
DS-603025		2.36	1.20	0.10	0.17	-	2	60.0	30.5	2.50	4.30	-	6145	0.900	8 342	1.350
DS-603027		2.36	1.20	0.11	0.19	-	2	60.0	30.5	2.75	4.75	-	9 117	1.000	12 360	1.500
DS-603030		2.36	1.20	0.12	0.19	-	2	60.0	30.5	3.00	4.70	-	9 407	0.850	13 269	1.280
DS-603035		2.36	1.20	0.14	0.20	-	2	60.0	30.5	3.50	5.00	-	12 574	0.750	18 225	1.130
DS-633118	C	2.48	1.22	0.07	0.16	-	2	63.0	31.0	1.80	4.15	-	3 658	1.175	4 237	1.760
DS-633125	B	2.48	1.22	0.10	0.17	-	2	63.0	31.0	2.50	4.25	-	5 270	0.875	7 179	1.310
DS-633130		2.48	1.22	0.12	0.19	-	2	63.0	31.0	3.00	4.80	-	8 981	0.900	12 536	1.350
DS-633135	A	2.48	1.22	0.14	0.19	-	2	63.0	31.0	3.50	4.90	-	10 359	0.700	15 025	1.050
DS-702520		2.76	1.00	0.08	0.18	-	2	70.0	25.5	2.00	4.50	-	3 771	1.250	4 441	1.880
DS-703025		2.76	1.20	0.10	0.19	-	2	70.0	30.5	2.50	4.90	-	6 297	1.200	8 031	1.800
DS-703030		2.76	1.20	0.12	0.20	-	2	70.0	30.5	3.00	5.10	-	8 376	1.050	11 453	1.580
DS-703530		2.76	1.40	0.12	0.20	-	2	70.0	35.5	3.00	5.10	-	9 007	1.050	12 316	1.580
DS-703535		2.76	1.40	0.14	0.21	-	2	70.0	35.5	3.50	5.30	-	11 380	0.900	16 180	1.350
DS-703540		2.76	1.40	0.16	0.23	-	2	70.0	35.5	4.00	5.80	-	16 634	0.900	23 923	1.350
DS-704040		2.76	1.59	0.16	0.22	-	2	70.0	40.5	4.00	5.60	-	16 099	0.800	23 351	1.200
DS-704050		2.76	1.59	0.20	0.24	-	2	70.0	40.5	5.00	6.20	-	22 728	0.600	33 672	0.900
DS-713620	C	2.80	1.42	0.08	0.18	-	2	71.0	36.0	2.00	4.60	-	4 432	1.300	5 144	1.950
DS-713625	B	2.80	1.42	0.10	0.18	-	2	71.0	36.0	2.50	4.50	-	5 054	1.000	6 725	1.500
DS-713640	A	2.80	1.42	0.16	0.22	-	2	71.0	36.0	4.00	5.60	-	14 157	0.800	20 535	1.200
DS-803125		3.15	1.22	0.10	0.21	-	2	80.0	31.0	2.50	5.30	-	5 933	1.400	7 239	2.100
DS-803130		3.15	1.22	0.12	0.22	-	2	80.0	31.0	3.00	5.50	-	7 847	1.250	10 369	1.880
DS-803140		3.15	1.22	0.16	0.24	-	2	80.0	31.0	4.00	6.10	-	13 677	1.050	19 447	1.580
DS-803630		3.15	1.42	0.12	0.22	-	2	80.0	36.0	3.00	5.70	-	9 196	1.350	11 936	2.030
DS-803640		3.15	1.42	0.16	0.24	-	2	80.0	36.0	4.00	6.20	-	15 168	1.100	21 400	1.650
DS-804122	C	3.15	1.61	0.09	0.20	-	2	80.0	41.0	2.25	5.20	-	5 715	1.475	6 611	2.210
DS-804130	B	3.15	1.61	0.12	0.21	-	2	80.0	41.0	3.00	5.30	-	7 838	1.150	10 539	1.730
DS-804140		3.15	1.61	0.16	0.24	-	2	80.0	41.0	4.00	6.20	-	16 213	1.100	22 874	1.650
DS-804150	A	3.15	1.61	0.20	0.26	-	2	80.0	41.0	5.00	6.70	-	22 928	0.850	33 682	1.280
DS-904625	C	3.54	1.81	0.10	0.22	-	2	90.0	46.0	2.50	5.70	-	6 585	1.600	7 684	2.400
DS-904635	B	3.54	1.81	0.14	0.24	-	2	90.0	46.0	3.50	6.00	-	10 416	1.250	14 189	1.880
DS-904650	A	3.54	1.81	0.20	0.28	-	2	90.0	46.0	5.00	7.00	-	21 617	1.000	31 354	1.500
DS-1004140		3.94	1.61	0.16	0.28	-	2	100.0	41.0	4.00	7.20	-	15 219	1.600	20 251	2.400
DS-1004150		3.94	1.61	0.20	0.31	-	2	100.0	41.0	5.00	7.75	-	22 937	1.375	32 328	2.060

Precision Metric Disc Springs

IIS Part No.	Dimensions						Dimensions					Characteristic Values			
	D _o (in)	d _i (in)	t (in)	h _o (in)	t' (in)	Group	D _o (mm)	d _i (mm)	t (mm)	h _o (mm)	t' (mm)	0.50h _o		0.75h _o	
												F (N)	s (mm)	F (N)	s (mm)
DS-1005127	C 3.94	2.01	0.11	0.24	-	2	100.0	51.0	2.70	6.20	-	7 410	1.750	8 613	2.630
DS-1005135	B 3.94	2.01	0.14	0.25	-	2	100.0	51.0	3.50	6.30	-	9 823	1.400	13 070	2.100
DS-1005140	3.94	2.01	0.16	0.28	-	2	100.0	51.0	4.00	7.00	-	15 341	1.500	20 674	2.250
DS-1005150	3.94	2.01	0.20	0.31	-	2	100.0	51.0	5.00	7.80	-	25 810	1.400	36 339	2.100
DS-1005160	A 3.94	2.01	0.24	0.32	-	2	100.0	51.0	6.00	8.20	-	32 937	1.100	48 022	1.650
DS-1125730	C 4.41	2.24	0.12	0.27	-	2	112.0	57.0	3.00	6.90	-	9 038	1.950	10 493	2.930
DS-1125740	B 4.41	2.24	0.16	0.28	-	2	112.0	57.0	4.00	7.20	-	13 341	1.600	17 752	2.400
DS-1125760	A 4.41	2.24	0.24	0.33	-	2	112.0	57.0	6.00	8.50	-	30 215	1.250	43 812	1.880
DS-1254140	4.92	1.61	0.16	0.32	-	2	125.0	41.0	4.00	8.20	-	13 943	2.100	17 346	3.150
DS-1255140	4.92	2.01	0.16	0.33	-	2	125.0	51.0	4.00	8.50	-	16 265	2.250	19 829	3.380
DS-1255150	4.92	2.01	0.20	0.35	-	2	125.0	51.0	5.00	8.90	-	22 931	1.950	30 705	2.930
DS-1255160	4.92	2.01	0.24	0.37	-	2	125.0	51.0	6.00	9.40	-	31 514	1.700	44 307	2.550
DS-1256150	4.92	2.40	0.20	0.35	-	2	125.0	61.0	5.00	9.00	-	25 526	2.000	33 965	3.000
DS-1256160	4.92	2.40	0.24	0.38	-	2	125.0	61.0	6.00	9.60	-	36 336	1.800	50 722	2.700
DS-1256180	4.92	2.40	0.31	0.43	0.30	3	125.0	61.0	8.00	10.90	7.50	65 305	1.450	93 765	2.180
DS-1256435	C 4.92	2.52	0.14	0.31	-	2	125.0	64.0	3.50	8.00	-	13 231	2.250	15 422	3.380
DS-1256450	B 4.92	2.52	0.20	0.33	-	2	125.0	64.0	5.00	8.50	-	21 924	1.750	29 950	2.630
DS-1256460	4.92	2.52	0.24	0.34	-	2	125.0	64.0	6.00	9.60	-	37 360	1.800	52 150	2.700
DS-1256480	A 4.92	2.52	0.31	0.42	0.30	3	125.0	64.0	8.00	10.60	7.50	59 520	1.300	85 926	1.950
DS-1257160	4.92	2.80	0.24	0.37	-	2	125.0	71.0	6.00	9.30	-	36 302	1.650	51 304	2.480
DS-1257180	4.92	2.80	0.31	0.41	0.29	3	125.0	71.0	8.00	10.40	7.40	59 149	1.200	85 494	1.800
DS-1257110	4.92	2.80	0.39	0.46	0.36	3	125.0	71.0	10.00	11.80	9.20	84 219	0.900	124 124	1.350
DS-1407238	C 5.51	2.83	0.15	0.34	-	2	140.0	72.0	3.80	8.70	-	14 773	2.450	17 201	3.680
DS-1407250	B 5.51	2.83	0.20	0.35	-	2	140.0	72.0	5.00	9.00	-	20 982	2.000	27 920	3.000
DS-1407280	A 5.51	2.83	0.31	0.44	0.30	3	140.0	72.0	8.00	11.20	7.50	59 967	1.600	85 251	2.400
DS-1506150	5.91	2.40	0.20	0.41	-	2	150.0	61.0	5.00	10.30	-	25 021	2.650	31 059	3.980
DS-1506160	5.91	2.40	0.24	0.43	0.00	2	150.0	61.0	6.00	10.80	-	34 161	2.400	45 456	3.600
DS-1507160	5.91	2.80	0.24	0.43	-	2	150.0	71.0	6.00	10.80	-	36 189	2.400	48 155	3.600
DS-1507180	5.91	2.80	0.31	0.47	0.30	3	150.0	71.0	8.00	12.00	7.50	64 684	2.000	89 851	3.000
DS-1508180	5.91	3.19	0.31	0.46	0.30	3	150.0	81.0	8.00	11.70	7.50	63 876	1.850	89 663	2.780
DS-1508110	5.91	3.19	0.39	0.51	0.37	3	150.0	81.0	10.00	13.00	9.30	96 120	1.500	139 128	2.250
DS-1608243	C 6.30	3.23	0.17	0.39	-	2	160.0	82.0	4.30	9.90	-	18 832	2.800	21 843	4.200
DS-1608260	B 6.30	3.23	0.24	0.41	-	2	160.0	82.0	6.00	10.50	-	30 431	2.250	41 051	3.380
DS-1608210	A 6.30	3.23	0.39	0.53	0.37	3	160.0	82.0	10.00	13.50	9.40	96 216	1.750	138 564	2.630
DS-1809248	C 7.09	3.62	0.19	0.43	-	2	180.0	92.0	4.80	11.00	-	22 731	3.100	26 442	4.650
DS-1809260	B 7.09	3.62	0.24	0.44	-	2	180.0	92.0	6.00	11.10	-	28 552	2.550	37 533	3.830
DS-1809210	A 7.09	3.62	0.39	0.55	0.37	3	180.0	92.0	10.00	14.00	9.40	88 141	2.000	125 417	3.000
DS-1809213	7.09	3.62	0.51	0.65	0.48	3	180.0	92.0	13.00	16.50	12.10	163 400	1.750	238 300	2.630
DS-2008280	7.87	3.23	0.31	0.56	0.30	3	200.0	82.0	8.00	14.20	7.60	60 013	3.100	78 034	4.650
DS-2008210	7.87	3.23	0.39	0.61	0.38	3	200.0	82.0	10.00	15.50	9.60	93 357	2.750	129 569	4.130
DS-2008212	7.87	3.23	0.47	0.65	0.45	3	200.0	82.0	12.00	16.60	11.50	127 191	2.300	182 737	3.450
DS-2009210	7.87	3.62	0.39	0.61	0.37	3	200.0	92.0	10.00	15.60	9.50	100 014	2.800	137 688	4.200
DS-2009212	7.87	3.62	0.47	0.66	0.45	3	200.0	92.0	12.00	16.80	11.40	139 548	2.400	199 269	3.600
DS-2009214	7.87	3.62	0.55	0.71	0.52	3	200.0	92.0	14.00	18.10	13.10	184 092	2.050	267 623	3.080

Precision Metric Disc Springs

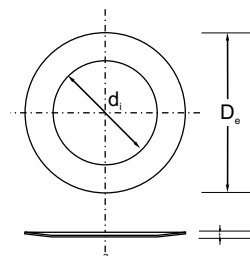
IIS Part No.		Dimensions					Group	Dimensions					Characteristic Values			
		D _e (in)	d _i (in)	t (in)	h _o (in)	t' (in)		D _e (mm)	d _i (mm)	t (mm)	h _o (mm)	t' (mm)	0.50h _o		0.75h _o	
													F (N)	s (mm)	F (N)	s (mm)
DS-20010255	C	7.87	4.02	0.22	0.49	-	2	200.0	102.0	5.50	12.50	-	30 882	3.500	36 111	5.250
DS-20010280	B	7.87	4.02	0.31	0.54	0.30	3	200.0	102.0	8.00	13.60	7.50	57 955	2.800	76 378	4.200
DS-20010210		7.87	4.02	0.39	0.61	0.37	3	200.0	102.0	10.00	15.60	9.40	106 099	2.800	145 357	4.200
DS-20010212	A	7.87	4.02	0.47	0.64	0.44	3	200.0	102.0	12.00	16.20	11.25	127 401	2.100	183 020	3.150
DS-20010214		7.87	4.02	0.55	0.72	0.52	3	200.0	102.0	14.00	18.20	13.10	199 476	2.100	289 181	3.150
DS-20011212		7.87	4.41	0.47	0.64	0.44	3	200.0	112.0	12.00	16.20	11.10	136 873	2.100	195 830	3.150
DS-20011214		7.87	4.41	0.55	0.69	0.51	3	200.0	112.0	14.00	17.50	12.90	176 156	1.750	257 208	2.630
DS-20011216		7.87	4.41	0.63	0.74	0.58	3	200.0	112.0	16.00	18.80	14.80	206 697	1.400	305 100	2.100
DS-22511260	**	8.86	4.41	0.24	0.54	0.24	3	225.0	112.0	6.00	13.60	6.00	39 660	3.800	45 500	5.700
DS-22511265	C	8.86	4.41	0.26	0.54	0.24	3	225.0	112.0	6.50	13.60	6.20	37 417	3.550	44 594	5.330
DS-22511280	B	8.86	4.41	0.31	0.57	0.30	3	225.0	112.0	8.00	14.50	7.50	55 412	3.250	70 788	4.880
DS-22511212	A	8.86	4.41	0.47	0.67	0.44	3	225.0	112.0	12.00	17.00	11.25	120 738	2.500	171 016	3.750
DS-22511216		8.86	4.41	0.63	0.81	0.59	3	225.0	112.0	16.00	20.50	15.00	247 100	2.250	360 100	3.380
DS-25010210		9.84	4.02	0.39	0.71	0.38	3	250.0	102.0	10.00	18.00	9.60	97 282	4.000	126 387	6.000
DS-25010212		9.84	4.02	0.47	0.75	0.45	3	250.0	102.0	12.00	19.00	11.50	133 130	3.500	182 962	5.250
DS-25012765	**	9.84	5.00	0.26	0.58	0.26	3	250.0	127.0	6.50	14.80	6.50	45 420	4.150	51 970	6.230
DS-25012770	C	9.84	5.00	0.28	0.58	0.26	3	250.0	127.0	7.00	14.80	6.70	42 527	3.900	50 466	5.850
DS-25012710	B	9.84	5.00	0.39	0.67	0.37	3	250.0	127.0	10.00	17.00	9.40	90 206	3.500	119 053	5.250
DS-25012712		9.84	5.00	0.47	0.75	0.44	3	250.0	127.0	12.00	19.30	11.25	156 021	3.650	210 942	5.480
DS-25012714	A	9.84	5.00	0.55	0.77	0.52	3	250.0	127.0	14.00	19.60	13.10	175 145	2.800	248 828	4.200
DS-25012716		9.84	5.00	0.63	0.86	0.59	3	250.0	127.0	16.00	21.80	15.00	267 295	2.900	383 017	4.350

BP Series Disc Springs

for BALL BEARING APPLICATIONS

Material : C1075 or Chrome-Vanadium Steel

Surface Finish : Natural Oiled or phosphates



● Load tolerances : $\pm 20\%$ at 75h

Bearing Disc Springs & Washers (Plain, Slotted and Multi Wave)

Disc and Belleville Inc. Stocks all types of Ball Bearing Disc Springs Plain, Slotted Preloading Bearing Washers. Ball-Bearing Disc Springs are used with radial Ball bearings to minimize vibration and shaft deflection. Proper preloading will increase bearing rigidity and eliminate excessive wear & tear and running noise.

Advantages of Ball Bearing Disc Springs

1.) Significant increase or decrease in applied force even with small variation in deflection..
2.) Backlash compensation & regressive curves help reduce preload variations changes.
3.) Very low force characteristic with very large deflection range.
4.) Multiplication of force by stacking of two or more in parallel.
5.) Available in all size to accommodate all bearing sizes.
6.) Elimination of noise and play in Ball Bearings.
7.) Round shape ensures equal distribution of load on the bearing ring.

Application of Preloaded Bearing Washers in Electric motors helps to reduce operating noise.

The preload force remains practically constant when there is axial displacement of the bearing as a result of thermal expansion.

If preload is primarily to protect the bearing from vibration damage when stationary, then greater preload is required.

Plain Ball Bearing Washers

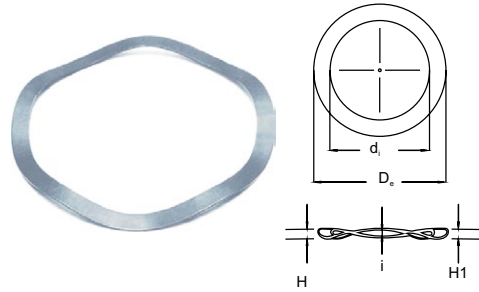
Part No.	Ball Bearing designation no.	Dimension (mm)			Height "h" (mm)	L0.50 (mm)	F0.50 (N)	L0.75 (mm)	F0.75 (N)
		D _e	d _i	Thickness "t"					
BP-090620	623	9.8	6.2	0.20	0.40	0.10	19	0.15	24
BP-120725	624	12.8	7.2	0.25	0.50	0.12	24	0.19	29
BP-150825	625 634	15.8	8.2	0.25	0.55	0.15	20	0.22	23
BP-180930	626 635	18.8	9.2	0.30	0.65	0.17	26	0.26	31
BP-181035	607	18.8	10.2	0.35	0.70	0.17	40	0.26	51
BP-211235	608 627	21.8	12.3	0.35	0.75	0.20	38	0.30	46
BP-231440	609	23.7	14.3	0.40	0.90	0.25	69	0.37	80
BP-251440	6000 629	25.7	14.3	0.40	0.90	0.25	54	0.37	64
BP-271740	6001	27.7	17.3	0.40	1.00	0.30	73	0.45	80
BP-291740	6200	29.7	17.3	0.40	1.10	0.35	80	0.52	82
BP-312040	6002 6201	31.7	20.4	0.40	1.10	0.35	79	0.52	81
BP-342040	6300	34.6	20.4	0.40	1.10	0.35	60	0.52	61
BP-342250	6003 6202	34.6	22.4	0.50	1.20	0.35	106	0.52	119
BP-362050	6301	36.6	20.4	0.50	1.30	0.40	103	0.60	111
BP-392550	6203	39.6	25.5	0.50	1.30	0.40	103	0.60	111
BP-412550	6004 6302	41.6	25.5	0.50	1.40	0.45	113	0.67	114
BP-463060	6005 6204 6303	46.5	30.5	0.60	1.50	0.45	140	0.67	155
BP-513560	6205 6304	51.5	35.5	0.60	1.50	0.45	124	0.67	135
BP-544060	6006	54.5	40.5	0.60	1.50	0.45	127	0.67	140
BP-614070	6007 6206 6305	61.5	40.5	0.70	1.80	0.55	164	0.82	186
BP-675070	6008	67.5	50.5	0.70	1.70	0.50	143	0.75	160
BP-714570	6306	71.5	45.5	0.70	2.10	0.70	190	1.05	185

Plain Ball Bearing Washers									
Part No.	Ball Bearing designation no.	Dimension (mm)			Height "h" (mm)	L0.50 (mm)	F0.50 (N)	L0.75 (mm)	F0.75 (N)
		D _e	d _i	Thickness "t"					
BP-715070	6207	71.5	50.5	0.70	2.10	0.70	223	1.05	217
BP-745580	6009	74.5	55.5	0.80	1.90	0.55	186	0.82	212
BP-795080	6307	79.5	50.5	0.80	2.30	0.75	228	1.12	228
BP-795580	6010 6208	79.5	55.5	0.80	2.30	0.75	264	1.12	264
BP-846090	6209	84.5	60.5	0.90	2.50	0.80	352	1.20	357
BP-896090	6308	89.5	60.5	0.90	2.50	0.80	284	1.20	288
BP-896590	6011 6210	89.5	65.5	0.90	2.50	0.80	330	1.20	333
BP-947510	6012	94.5	75.5	1.00	2.20	0.60	272	0.90	325
BP-996510	6309	99.0	65.5	1.00	2.60	0.80	274	1.20	293
BP-997010	6013 6211	99.0	70.5	1.00	2.60	0.80	312	1.20	333
BP-1097012	6310	109.0	70.5	1.25	2.70	0.73	294	1.09	356
BP-1097512	6014 6212	109.0	75.5	1.25	2.70	0.73	327	1.09	394
BP-1149012	6015	114.0	90.5	1.25	2.45	0.60	311	0.90	396
BP-1197512	6311	119.0	75.5	1.25	2.80	0.78	270	1.16	319
BP-1198512	6213	119.0	85.5	1.25	2.80	0.78	331	1.16	391
BP-1249012	6016 6214	124.0	90.5	1.25	3.00	0.88	392	1.31	441
BP-1298512	6312	129.0	85.5	1.25	3.20	0.98	375	1.46	402
BP-1299512	6017 6215	129.0	95.5	1.25	3.20	0.98	328	1.46	441
BP-1399012	6313	139.0	90.5	1.25	3.25	1.00	329	1.50	353
BP-13910112	6018 6216	139.0	101.0	1.25	3.25	1.00	398	1.50	427
BP-1499515	6314	149.0	95.5	1.50	3.20	0.85	312	1.28	380
BP-14910615	6020 6217	149.0	106.0	1.50	3.20	0.85	368	1.28	448
BP-15910115	6315	159.0	101.0	1.50	3.50	1.00	356	1.50	409
BP-15911115	6021 6218	159.0	111.0	1.50	3.50	1.00	415	1.50	477
BP-16911115	6316	169.0	111.0	1.50	3.80	1.15	432	1.73	472
BP-16912115	6022 6219	169.0	121.0	1.50	3.80	1.15	497	1.73	542
BP-17912120	6317	179.0	121.0	2.00	4.20	1.10	702	1.65	861
BP-17912620	6024 6220	179.0	126.0	2.00	4.20	1.10	761	1.65	934
BP-18912120	6318	189.0	121.0	2.00	4.30	1.15	628	1.73	760
BP-18913120	6221	189.0	131.0	2.00	4.30	1.15	702	1.73	849
BP-19813120	6319	198.0	131.0	2.00	4.50	1.25	691	1.88	813
BP-19814120	6026 6222	198.0	141.0	2.00	4.50	1.25	779	1.88	917
BP-21315122	6224 6320	213.0	151.0	2.25	4.50	1.12	746	1.69	941
BP-22316122	6030 6321	223.0	161.0	2.25	4.60	1.17	747	1.76	933
BP-22816122	6226	228.0	161.0	2.25	4.95	1.35	864	2.02	1030
BP-23816122	6032 6322	238.0	161.0	2.25	5.25	1.50	886	2.25	1020
BP-24817125	6228	248.0	171.0	2.50	5.00	1.25	795	1.88	1000
BP-25817125	6034 6324	258.0	171.0	2.50	5.50	1.50	928	2.25	1108
BP-26818125	6230	268.0	181.0	2.50	5.70	1.60	990	2.40	1160
BP-27818125	6036 6326	278.0	181.0	2.50	6.00	1.75	1020	2.63	1160
BP-28819127	6038 6232	288.0	191.0	2.75	5.75	1.50	931	2.25	1150
BP-29819127	6328	298.0	191.0	2.75	6.35	1.80	1130	2.70	1310
BP-30820230	6040 6234	308.0	202.0	3.00	6.10	1.55	1050	2.33	1300
BP-31821230	6236 6330	318.0	212.0	3.00	6.20	1.60	1060	2.40	1300
BP-33823230	6044 6238 6332	338.0	232.0	3.00	6.60	1.80	1180	2.70	1410
BP-35824230	6048 6240 6334	358.0	242.0	3.00	7.20	2.10	1350	3.15	1530

Wave Washers for Bearings

Disc and Belleville Inc. Wave washers are as per DIN 137 & DIN 6904. These Wave Washers are made from prime Quality Spring Steel. Stainless Steel and Copper are also readily available in every standard sizes.

Wave Washers are positioned underneath a nut, an axle bearing, or a joint, to reduce friction, avoid leakage, isolate, stop loosening or distribute pressure

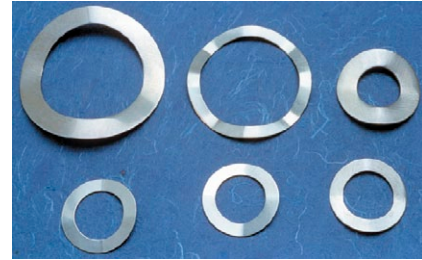


Wave Washers for Bearings

Part No.	Bearing Type	Dimension (mm)					Load (N)	Compressed Height 'H' At load
		D _e (min)	D _e (max)	d _i (min)	d _i (max)	t (+/-0.1)		
WB-312604	6201	31.20	31.50	26.50	26.90	0.4	70.60 - 105.90	1.5
WB-383304	6203	38.50	39.00	33.00	33.50	0.4	98.10 - 147.10	1.5
WB-453905	6204	45.50	46.00	39.50	40.00	0.5	117.70 - 147.10	1.5
WB-494005	6205 6304	49.50	50.00	40.50	41.00	0.5	247.20 - 223.70	2.5
WB-596005	6206 6305	59.70	60.30	49.70	50.30	0.5	176.60 - 264.90	2.0
WB-696005	6306	69.50	70.00	60.00	60.50	0.5	176.60 - 264.90	2.0
WB-776905	6308	77.50	78.00	69.50	70.00	0.5	235.40 - 353.20	2.5
WB-877705	6308	87.00	87.50	77.50	78.00	0.5	235.40 - 353.20	2.0
WB-998108	6309	99.20	99.70	81.50	82.00	0.8	266.80 - 400.20	2.0
WB-1098908	6310 6212	109.00	109.50	89.50	90.00	0.8	294.30 - 441.20	3.75
WB-1199908	6213	119.00	120.00	99.50	100.00	0.8	318.80 - 637.60	2.5
WB-12210508	6214	122.50	123.50	105.00	105.50	0.8	343.30 - 686.70	3.0
WB-15713409	6315 6218	157.50	158.50	134.50	135.50	0.9	441.40 - 882.90	3.0
WB-16814009	6318 6219	168.00	169.00	140.00	140.50	0.9	466.00 - 931.90	3.0

Wave Washers as per DIN 137 B

For using between parts on shafts



Wave Washers as per DIN 137 B

We stock all types of Wave Springs Washers as per DIN 137 B. These Wave Washers are made from prime quality Spring Steel. Stainless Steel and Copper are also readily available in standard sizes. Wave Washers are wavy metal washers designed to offer a compensating spring force and maintain a load or take up shock. These are disks of irregular shape formed in such a way that when loaded it deflects and acts like a spring providing a preload between two surfaces. Wave Washers are very useful for limited radial space and moderate thrust load. e.g. Axial loading of Ball bearing.

The number of waves can be two, three or more. The spring rate is proportional to the number of waves raised to the fourth power.

Wave Washers are generally preferred as cushion / cushion spacers between parts on shafts or to take up the probable deviation in assembled parts. These are positioned underneath a nut, an axle bearing, or a joint, to reduce friction, avoid leakage, isolate, stop loosening or distribute pressure.

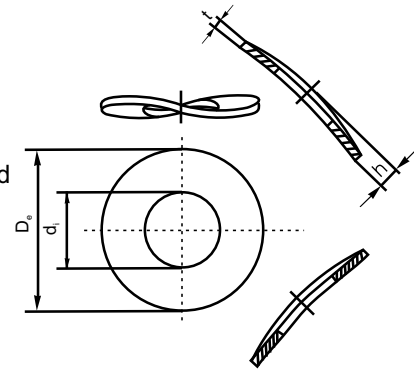


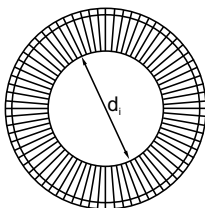
Table 1 : Dimensions of type B Wave washers

Part No.	Sizes in Inches				Sizes in mm						Nominal Size
	D _e	d _i	t	h	D _e	d _i	Thickness (t)		Height (h)		
Plain Oil Finish				(min)	js16	H14	Nominal size	Tolerance	min.	max.	
WW-083205	0.315	0.126	0.020	0.031	8	3.2	0.5	+ /-0.05	0.8	1.6	M 3 ²
WW-083705	0.315	0.146	0.020	0.035	8	3.7	0.5	+ /-0.05	0.9	1.8	M 3.5 ²
WW-094305	0.354	0.169	0.020	0.039	9	4.3	0.5	+ /-0.05	1.0	2.0	M 4
WW-115305	0.433	0.209	0.020	0.043	11	5.3	0.5	+ /-0.05	1.1	2.2	M 5
WW-126405	0.472	0.252	0.020	0.051	12	6.4	0.5	+ /-0.05	1.3	2.6	M 6
WW-147408	0.551	0.291	0.031	0.059	14	7.4	0.8	+ /-0.06	1.5	3.0	M 7
WW-158408	0.591	0.331	0.031	0.059	15	8.4	0.8	+ /-0.06	1.5	3.0	M 8
WW-211010	0.827	0.413	0.039	0.083	21	10.5	1.0	+ /-0.07	2.1	4.2	M 10
WW-241312	0.945	0.512	0.047	0.098	24	13	1.2	+ /-0.07	2.5	5.0	M 12
WW-281516	1.102	0.591	0.063	0.118	28	15	1.6	+ /-0.08	3.0	6.0	M 14
WW-301716	1.181	0.669	0.063	0.126	30	17	1.6	+ /-0.08	3.2	6.4	M 16
WW-341916	1.339	0.748	0.063	0.130	34	19	1.6	+ /-0.08	3.3	6.6	M 18
WW-362116	1.417	0.827	0.063	0.146	36	21	1.6	+ /-0.08	3.7	7.4	M 20
WW-402318	1.575	0.906	0.071	0.154	40	23	1.8	+ /-0.10	3.9	7.8	M 22
WW-442518	1.732	0.984	0.071	0.161	44	25	1.8	+ /-0.10	4.1	8.2	M 24
WW-502820	1.969	1.102	0.079	0.185	50	28	2.0	+ /-0.10	4.7	9.4	M 27
WW-563122	2.205	1.220	0.087	0.197	56	31	2.2	+ /-0.10	5.0	10.0	M 30
WW-603422	2.362	1.339	0.087	0.209	60	34	2.2	+ /-0.10	5.3	10.6	M 33
WW-683725	2.677	1.457	0.098	0.228	68	37	2.5	+ /-0.15	5.8	11.6	M 36

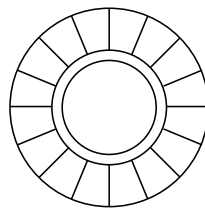
- 1) The diameter tolerances specified apply to spring washers when pressed flat. The tolerance on coaxiality between d_i and d_e (related to d₂) shall be 1/2 IT 14
- 2) Values to be complied with in the spring force test as described in DIN 267 Part 26 have not as yet been specified for this size.

LR Series of Washers

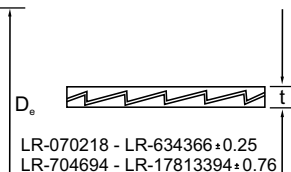
Lock & Forget
Dimensions Zinc Plated
Yellow Chromated



LR-070218 - LR-130825*0.10
LR-161125 - LR-634366*0.20
LR-704694 - LR-17813394*0.05



LR-070218 - LR-634366*0.20
LR-704694 - LR-17813394*2.03



LR-070218 - LR-634366*0.25
LR-704694 - LR-17813394*0.76

LockRite Washers are used in Pairs. Both Washers have Radial Teeth and are assembled opposite to each other. LockRite Washers can be used with Bolts and Threaded Holes. When using with Bolts and Nuts 1 Pair should be used on either side. LockRite Washers eliminate the use of Adhesive for Locking as it automatically secures the Joints.

Advantages :

1. Avoids Loosening due to Vibration and Heavy Loads.
2. Perfect Locking is achieved at any Preload Levels.
3. When Maximum Safety is desired while Tightening Nut / Bolt.
4. Easy to assemble and dismantle.
5. LockRite Washers are widely used in various industries such as Construction, Automotive, Mining, Oil & Natural Gas and Power Plants.

Part No.	Bolt Size		Diameter (inch)		Thickness t (inch)	Diameter (mm)		Thickness t (mm)	Approx. Weight Kgs. / Pairs
	UNC	Metric	D _e	d _i		D _e	D _i		
LR-070218	# 5	M3	0.28	0.13	0.07	7.10	3.30	1.80	0.04
LR-070318	# 6	M3.5	0.29	0.15	0.07	7.40	3.80	1.80	0.04
LR-070418	# 8	M4	0.29	0.17	0.07	7.40	4.30	1.80	0.04
LR-080418	# 8	M4	0.35	0.17	0.07	8.90	4.30	1.80	0.06
LR-080518	# 10	M5	0.35	0.21	0.07	8.90	5.30	1.80	0.05
LR-100518	# 10	M5	0.43	0.21	0.07	10.90	5.30	1.80	0.10
LR-100618		M6	0.43	0.26	0.07	10.90	6.60	1.80	0.07
LR-130625		M6	0.53	0.26	0.10	13.50	6.60	2.50	0.20
LR-110718	1/4"		0.45	0.28	0.07	11.40	7.10	1.80	0.08
LR-130725	1/4"		0.53	0.28	0.10	13.50	7.10	2.50	0.18
LR-130825	5/16"	M8	0.53	0.34	0.10	13.50	8.60	2.50	0.15
LR-160825	5/16"	M8	0.65	0.34	0.10	16.50	8.60	2.50	0.28
LR-161025	3/8"		0.65	0.41	0.10	16.50	10.40	2.50	0.24
LR-211025	3/8"		0.83	0.41	0.10	21.10	10.40	2.50	0.47
LR-161125		M10	0.65	0.42	0.10	16.50	10.70	2.50	0.22
LR-211125		M10	0.83	0.42	0.10	21.10	10.70	2.50	0.45
LR-181125	7/16"	M11	0.73	0.45	0.10	18.50	11.40	2.50	0.30
LR-191325		M12	0.77	0.51	0.10	19.60	13.00	2.50	0.29
LR-251333		M12	1.00	0.51	0.10	25.40	13.00	3.30	0.93
LR-191425	1/2"		0.77	0.53	0.13	19.60	13.50	2.50	0.27
LR-251433	1/2"		1.00	0.53	0.10	25.40	13.50	3.30	0.90
LR-231533	9/16"	M14	0.91	0.60	0.13	23.10	15.20	3.30	0.58
LR-301533	9/16"	M14	1.21	0.60	0.13	30.70	15.20	3.30	1.39
LR-251733	5/8"	M16	1.00	0.67	0.13	25.40	17.00	3.30	0.69
LR-301733	5/8"	M16	1.21	0.67	0.13	30.70	17.00	3.30	1.27
LR-351933		M18	1.41	0.77	0.13	35.80	19.60	3.30	0.90

Part No.	Bolt Size		Diameter (inch)		Thickness t (inch)	Diameter (mm)		Thickness t (mm)	Approx. Weight Kgs. / Pairs
	UNC	Metric	D _e	d _i		D _e	d _i		
LR-341933		M18	1.36	0.77	0.13	34.50	19.60	3.30	1.69
LR-302033	3/4"		1.21	0.79	0.13	30.70	20.10	3.30	1.05
LR-392033	3/4"		1.54	0.79	0.13	39.10	20.10	3.30	2.19
LR-302133		M20	1.21	0.84	0.13	30.70	21.30	3.30	0.94
LR-392133		M20	1.54	0.84	0.13	39.10	21.30	3.30	2.07
LR-342333	7/8"	M22	1.36	0.92	0.13	34.50	23.40	3.30	1.25
LR-412346	7/8"	M22	1.65	0.92	0.18	41.90	23.40	4.60	3.30
LR-392533		M24	1.54	1.00	0.13	39.10	25.40	3.30	1.70
LR-482546		M24	1.91	1.00	0.18	48.50	25.40	4.60	4.64
LR-392733	1"		1.54	1.10	0.13	39.10	27.90	3.30	1.44
LR-482746	1"		1.91	1.10	0.18	48.50	27.90	4.60	4.27
LR-412833		M27	1.65	1.12	0.13	41.90	28.50	3.30	3.67
LR-482846		M27	1.91	1.12	0.18	48.50	28.50	4.60	5.91
LR-473166	1.1/8"	M30	1.85	1.24	0.26	47.00	31.50	6.60	4.68
LR-483466	1.1/4"	M33	1.91	1.35	0.26	48.50	34.30	6.60	4.48
LR-553766	1.3/8"	M36	2.17	1.47	0.26	55.10	37.30	6.60	6.23
LR-584066	1.1/2"	M39	2.30	1.59	0.26	58.40	40.40	6.60	6.86
LR-634366		M42	2.48	1.70	0.26	63.00	43.20	6.60	8.00
LR-704694	1.3/4"	M45	2.76	1.82	0.37	70.10	46.20	9.40	15.82
LR-744994		M48	2.95	1.95	0.37	74.90	49.50	9.40	18.14
LR-805394	2"	M52	3.15	2.11	0.37	80.00	53.60	9.40	20.14
LR-855994	2.1/4"	M56	3.35	2.33	0.37	85.10	59.20	9.40	21.36
LR-896394		M60	3.54	2.48	0.37	89.90	63.00	9.40	23.55
LR-956794	2.1/2"	M64	3.74	2.64	0.37	95.00	67.10	9.40	25.86
LR-1007194		M68	3.94	2.80	0.37	100.00	71.10	9.40	28.23
LR-1057594		M72	4.13	2.96	0.37	105.00	75.20	9.40	30.77
LR-1107994	3"	M76	4.33	3.11	0.37	110.00	79.00	9.40	33.36
LR-1158394		M80	4.53	3.27	0.37	115.00	83.10	9.40	36.09
LR-1208894		M85	4.72	3.47	0.37	120.00	88.10	9.40	37.86
LR-1309294		M90	5.12	3.64	0.37	130.00	92.50	9.40	47.73
LR-1359794		M95	5.31	3.83	0.37	135.00	97.30	9.40	50.00
LR-14510394		M100	5.71	4.07	0.37	145.00	103.40	9.40	59.09
LR-15010894		M105	5.91	4.27	0.37	150.00	108.50	9.40	61.36
LR-15511394		M110	6.10	4.46	0.37	155.00	113.30	9.40	63.64
LR-16511894		M115	6.50	4.66	0.37	165.00	118.40	9.40	75.45
LR-17012394		M120	6.69	4.86	0.37	170.00	123.40	9.40	78.18
LR-17312894		M125	6.81	5.06	0.37	173.00	128.50	9.40	76.82
LR-17813394		M130	7.01	5.25	0.37	178.00	133.30	9.40	79.55

SW Series of Washers

to sustain Preload &
Avoid Loosening



Serrated Safety Washers (Rib washers)

Disc and Belleville Inc. Serrated Safety Washers are ready to fit washer to sustain preload and avoid loosening. When you tighten the screw, the serrations crunch into the mating faces and prevents the screw from loosening up due to vibrations etc. Also the disc shape supports to hold the necessary tension.

They are available in various sizes for Bolts and screws.

Serrated Washers are Disc Springs with Trapezoidal Cross Section on both sides for gripping. The diameters for Serrated Washer are matched to screw dimensions.

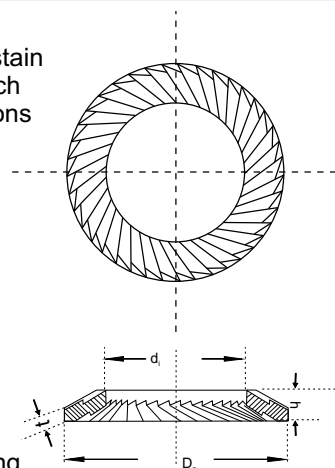
The outer diameter of washer is matched to the head diameter of pan head.

This allows using the Serrated Safety Washers with almost every screw and bolt including recessed heads except countersunk screw.

The Advantages of Serrated Safety Washers are:

- 1.Used for high vibration resistance due to positive rib contact.
- 2.Excellent pretensioning
- 3.Through proper radius selection, no splitting/cracking occurs during tightening.
- 4.The concentric force of the washer eliminates the chances of bending the fastener.
- 5.Extensive application and flexibility.

Disc and Belleville Inc. has ready stock of all the sizes of Serrated Safety Washers.

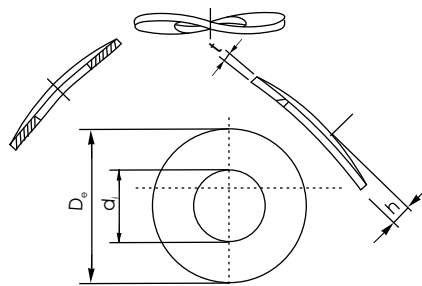


Part No.	Dimension									For Bolts		Nominal Size (mm)
	Inches				mm							
	D _e	d _i	t	h (min)	D _e (h14)	d _i (h14)	t	h (max)	h (min)	Inch.	Metric	
SW-030103	0.126	0.067	0.014	0.024	3.20	1.70	0.35	0.60	0.38		1.6	1.60
SW-040203	0.157	0.087	0.014	0.024	4.00	2.20	0.35	0.60	0.39		2	2.00
SW-040204	0.189	0.106	0.018	0.035	4.80	2.70	0.45	0.90	0.49		2.5	2.50
SW-050304	0.217	0.126	0.018	0.035	5.50	3.20	0.45	0.90	0.51	1/8	3	3.00
SW-060304	0.236	0.146	0.018	0.035	6.00	3.70	0.45	0.90	0.52		3.5	3.50
SW-070405	0.276	0.169	0.020	0.039	7.00	4.30	0.50	1.00	0.59	5/32	4	4.00
SW-090506	0.354	0.209	0.024	0.043	9.00	5.30	0.60	1.10	0.73	3/16	5	5.00
SW-100607	0.394	0.252	0.028	0.047	10.00	6.40	0.70	1.20	0.82		6	6.00
SW-090607	0.374	0.264	0.028	0.047	9.50	6.70	0.70	1.20	0.79	1/4		6.35
SW-120707	0.472	0.291	0.028	0.051	12.00	7.40	0.70	1.30	0.89		7	7.00
SW-130808	0.512	0.331	0.031	0.055	13.00	8.40	0.80	1.40	0.98	5/16	8	8.00
SW-161010	0.630	0.413	0.039	0.063	16.00	10.50	1.00	1.60	1.21	3/8	10	10.00
SW-151110	0.626	0.457	0.039	0.063	15.90	11.60	1.00	1.60	1.18	7/16		11.10
SW-181311	0.709	0.512	0.043	0.067	18.00	13.00	1.10	1.70	1.31		12	12.00
SW-191311	0.748	0.539	0.043	0.071	19.00	13.70	1.10	1.80	1.33	1/2		12.70
SW-221512	0.866	0.591	0.047	0.079	22.00	15.00	1.20	2.00	1.52	9/16	14	14.00
SW-241713	0.945	0.669	0.051	0.083	24.00	17.00	1.30	2.10	1.63	5/8	16	16.00
SW-271915	1.063	0.748	0.059	0.091	27.00	19.00	1.50	2.30	1.85		18	18.00
SW-302015	1.181	0.787	0.059	0.098	30.00	20.00	1.50	2.50	1.98	3/4		19.00
SW-302115	1.181	0.827	0.059	0.098	30.00	21.00	1.50	2.50	1.94		20	20.00
SW-332315	1.299	0.906	0.059	0.106	33.00	23.00	1.50	2.70	2.08	7/8	22	22.00
SW-362518	1.417	1.008	0.071	0.114	36.00	25.60	1.80	2.90	2.32		24	24.00
SW-382720	1.496	1.063	0.079	0.122	38.00	27.00	2.00	3.10	2.52	1		25.40
SW-392820	1.535	1.126	0.079	0.122	39.00	28.60	2.00	3.10	2.52		27	27.00
SW-453120	1.772	1.244	0.079	0.142	45.00	31.60	2.00	3.60	2.78	1 1/8	30	30.00
SW-543825	2.126	1.496	0.098	0.165	54.00	38.00	2.50	4.20	3.38	1 3/8	36	36.00

CW Series of Washers

Disc and Belleville Inc. Curved Washers are made of tempered steel and stainless in some sizes. Curved Washers are made as per DIN 137. Other non-standrad sizes are also available.

Applications : 1. Fasteners 2. Absorbing Vibrations 3. Compensation for Temperature Changes 4. Eliminating Side and End Play 5. Controlling End Pressure.



Dimensions										
Plain Finish (Oiled) Part No.	in inches				in mm					Bolt or Screw Size
	D _e	d _i	t	h(min)	D _e	d _i	t	h max	h min	
CW-020102	0.098	0.043	0.008	0.014	2.5	1.1	0.2	0.35	0.7	M 1
CW-030102	0.118	0.051	0.008	0.014	3	1.3	0.2	0.35	0.7	M 1.2
CW-030202	0.118	0.059	0.010	0.016	3	1.5	0.25	0.4	0.8	M 1.4
CW-040102	0.157	0.071	0.010	0.018	4	1.8	0.25	0.45	0.9	M 1.7
CW-040202	0.157	0.075	0.010	0.018	4	1.9	0.25	0.45	0.9	M 1.8
CW-040203	0.177	0.087	0.012	0.020	4.5	2.2	0.3	0.5	1	M 2
CW-050203	0.197	0.098	0.012	0.020	5	2.5	0.3	0.5	1	M 2.3
CW-050303	0.217	0.110	0.012	0.022	5.5	2.8	0.3	0.55	1.1	M 2.6
CW-060304	0.236	0.126	0.016	0.026	6	3.2	0.4	0.65	1.3	M 3
CW-070304	0.276	0.146	0.016	0.028	7	3.7	0.4	0.7	1.4	M 3.5
CW-080405	0.315	0.169	0.020	0.031	8	4.3	0.5	0.8	1.6	M 4
CW-100505	0.394	0.209	0.020	0.035	10	5.3	0.5	0.9	1.8	M 5
CW-110605	0.433	0.252	0.020	0.043	11	6.4	0.5	1.1	2.2	M 6
CW-120705	0.472	0.291	0.020	0.047	12	7.4	0.5	1.2	2.4	M 7
CW-150805	0.591	0.331	0.020	0.067	15	8.4	0.5	1.7	3.4	M 8
CW-181008	0.709	0.431	0.031	0.079	18	10.5	0.8	2	4	M 10



International Springs Ltd.



International Springs Ltd.

Distributor of all types of Disc Spring, Belleville Washers,
Curved Washers, Wave Spring Washers,
Serrated Rib Washers & Safety Washers.

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