

You asked, we listened and we responded with an expanded line of Stock Belleville Washers.

When your compression spring application requires a high load in a small space, Lee Spring's Belleville Washers can be the solution.

- Conical configuration enables them to support high loads with relatively small deflections and solid heights compared to helical springs.
- Often used to solve vibration, thermal expansion, relaxation and bolt creep problems.



Lee Spring Belleville Washers are manufactured in 300 Series Stainless Steel. This alloy offers good corrosion resistance for most applications. Additionally, Lee Spring Washers are passivated to remove contaminants and further improve resistance to corrosion. 300 Series Stainless Steel is slightly magnetic and is recommended for any applications where the temperature is below 500° F (260° C).

Additional load flexibility can be achieved by stacking Belleville Washers in various configurations. As shown in the diagrams below, Belleville Washers can be used in four different ways:

- Single:** One washer
- Parallel:** All washers stacked the same way
- Series:** All washers stacked opposite each other
- Series-Parallel:** A combination of the two

A single Belleville Spring Washer has a specific load for a given deflection. Two washers stacked in *parallel* will yield

double the load of a single washer for the same deflection; three washers will yield triple the load; four washers will yield four times the load, etc.

Alternatively, two washers stacked in *series* will yield double the **deflection** of a single washer for the same load; three washers will yield triple the deflection; four washers will yield four times the deflection, etc.

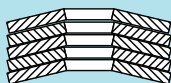
Various series-parallel combinations therefore can provide a wide variety of combined results of load versus deflection for the stack. Consequently, depending upon the application, the designer can:

- Stack in “parallel” to increase load
- Stack in “series” to increase deflection
- Adjust the load and deflection of a washer stack by adding or removing individual washers and/or the sequence in which they are used, whether in series or parallel.

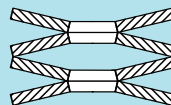
VARIOUS CONFIGURATIONS OF BELLEVILLE WASHERS



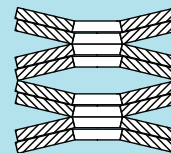
Single
ONE WASHER



Parallel
ALL WASHERS STACKED
THE SAME WAY

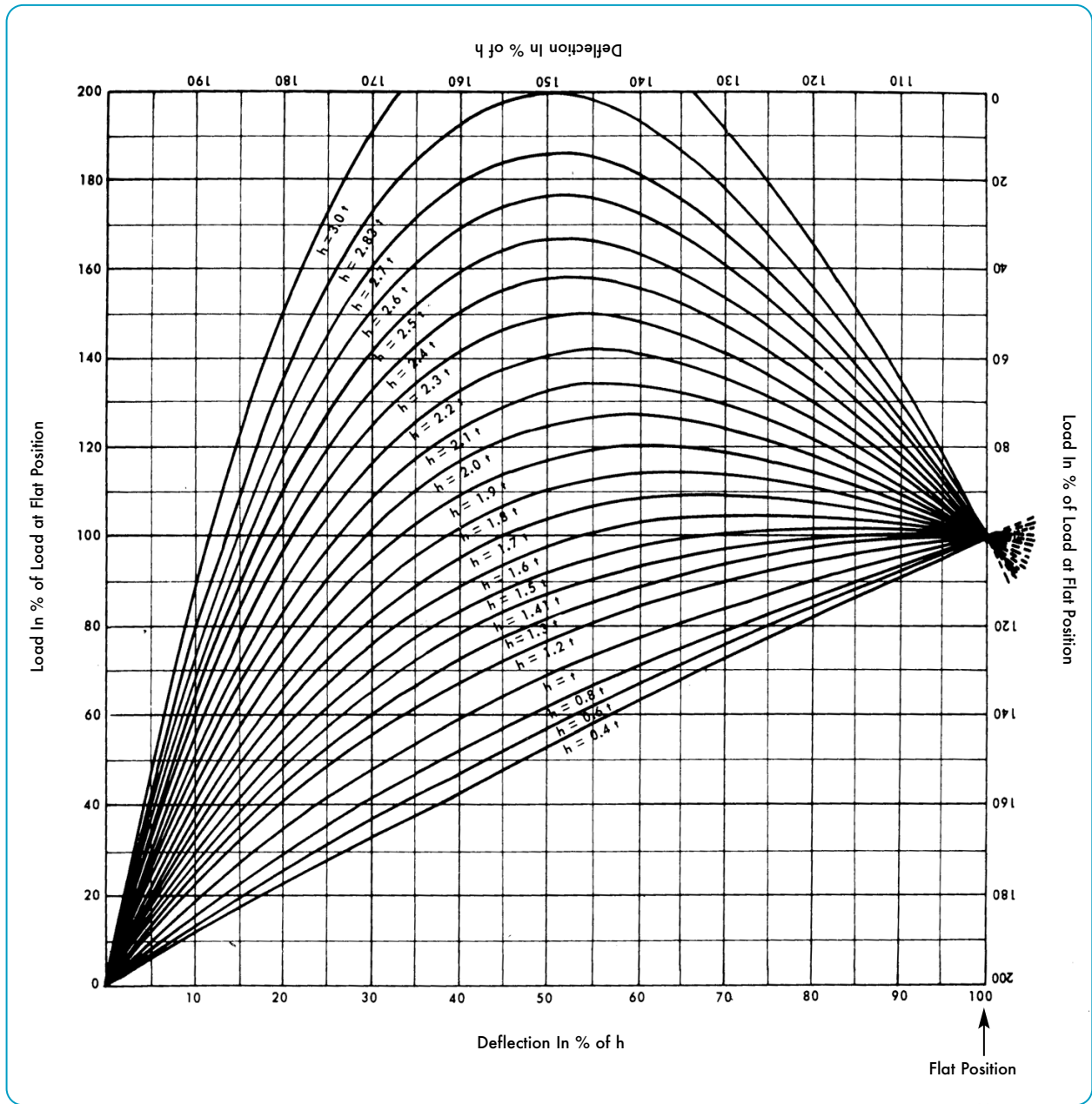


Series
ALL WASHERS STACKED
OPPOSITE EACH OTHER



Series Parallel
A COMBINATION
OF THE TWO

BELLEVILLE SPRING WASHERS

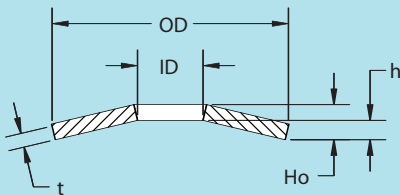


SELECTING BELLEVILLE WASHERS

Lee Spring Belleville Washer part numbers reflect three of the key measurement parameters. As shown in the diagram below the washer part number is configured as follows:

Washer Part Number **093-005-188**

Measurement Parameters **ID t OD**



- ID** Represents the washer inside diameter. This is a *minimum* measurement and reflects the **bolt size** that the washer will accommodate.
- t** Represents the washer material thickness as well as the washer solid (flat) height.
- OD** Represents the washer outside diameter. This outside diameter is the *maximum* outside diameter as supplied and prior to loading.

OTHER IMPORTANT CONSIDERATIONS ARE:

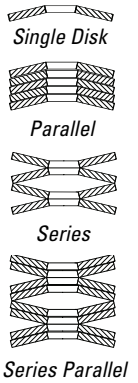
- Ho** Overall Height, unloaded
- h** $h = Ho - t$
- Pmax** Load at flat (the load at full compression)

In order to obtain intermediate loads for Belleville Washers, you can use the Load-Deflection diagram above.

BELLEVILLE SPRING WASHERS

300 SERIES • Stainless Steel (Passivated)

LEE STOCK NUMBER	BOLT SIZE	INSIDE DIAMETER (ID)		OUTSIDE DIAMETER (OD)		THICKNESS (t)		OVERALL HEIGHT UNLOADED (Ho)		CALCULATED LOAD AT FLAT (Pmax)		PRICE GROUP
		IN.	MM	IN.	MM	IN.	MM	IN.	MM	LB.	KG	
093-005-188	3/32	.093	2.36	.188	4.78	.005	.13	.014	.36	5.7	2.6	G
093-006-188	3/32	.093	2.36	.188	4.78	.006	.15	.015	.38	9.8	4.5	G
093-007-188	3/32	.093	2.36	.188	4.78	.007	.18	.014	.36	12.2	5.5	G
093-009-188	3/32	.093	2.36	.188	4.78	.009	.23	.014	.36	18.4	8.4	G
093-010-188	3/32	.093	2.36	.188	4.78	.010	.25	.015	.38	25.3	11.5	G
125-008-250	1/8	.125	3.18	.250	6.35	.008	.20	.016	.41	11.8	5.4	F
125-013-250	1/8	.125	3.18	.250	6.35	.013	.33	.020	.51	44.3	20.1	F
138-010-281	#6	.138	3.51	.281	7.14	.010	.25	.020	.51	22.6	10.2	F
138-013-281	#6	.138	3.51	.281	7.14	.013	.33	.021	.53	39.7	18.0	F
138-015-281	#6	.138	3.51	.281	7.14	.015	.38	.023	.58	60.9	27.6	F
148-015-281	#6	.148	3.76	.281	7.14	.015	.38	.024	.61	71.4	32.4	F
156-009-312	5/32	.156	3.96	.312	7.92	.009	.23	.020	.51	14.8	6.7	F
156-010-312	5/32	.156	3.96	.312	7.92	.010	.25	.020	.51	18.5	8.4	F
156-011-312	5/32	.156	3.96	.312	7.92	.011	.28	.022	.55	26.1	11.8	F
156-015-312	5/32	.156	3.96	.312	7.92	.015	.38	.023	.58	49.9	22.6	F
156-017-312	5/32	.156	3.96	.312	7.92	.017	.43	.025	.64	72.6	32.9	F
187-012-375	3/16	.187	4.75	.375	9.53	.012	.30	.024	.61	26.5	12.0	F
187-015-375	3/16	.187	4.75	.375	9.53	.015	.38	.025	.64	43.1	19.6	F
187-017-375	3/16	.187	4.75	.375	9.53	.017	.43	.026	.66	56.5	25.6	F
187-020-375	3/16	.187	4.75	.375	9.53	.020	.51	.029	.74	92.0	41.7	F
187-022-375	3/16	.187	4.75	.375	9.53	.022	.56	.030	.76	108.8	49.3	F
187-030-375	3/16	.187	4.75	.375	9.53	.030	.76	.036	.91	206.9	93.9	F
187-020-562	3/16	.187	4.75	.562	14.27	.020	.48	.037	.94	69.0	31.3	F
187-028-562	3/16	.187	4.75	.562	14.27	.028	.71	.042	1.07	156.0	70.8	F
218-020-437	#12	.218	5.54	.437	11.10	.020	.51	.032	.81	90.3	41.0	F
218-023-437	#12	.218	5.54	.437	11.10	.023	.58	.034	.86	125.9	57.1	F
218-035-687	#12	.218	5.54	.687	17.45	.035	.86	.050	1.27	217.7	98.8	F
250-017-500	1/4	.250	6.35	.500	12.70	.017	.43	.029	.74	42.4	19.2	F
250-018-500	1/4	.250	6.35	.500	12.70	.018	.46	.030	.76	50.4	22.8	F
250-020-500	1/4	.250	6.35	.500	12.70	.020	.51	.032	.81	69.1	31.3	F
250-023-500	1/4	.250	6.35	.500	12.70	.023	.58	.036	.91	113.8	51.6	F
250-024-500	1/4	.250	6.35	.500	12.70	.024	.61	.038	.97	139.3	63.2	F
250-025-500	1/4	.250	6.35	.500	12.70	.025	.64	.039	.99	157.4	71.4	F
250-038-500	1/4	.250	6.35	.500	12.70	.038	.97	.047	1.19	355.3	161.2	F
250-042-562	1/4	.250	6.35	.562	14.27	.042	1.07	.055	1.40	520.0	235.8	F
250-052-687	1/4	.250	6.35	.687	17.45	.052	1.32	.069	1.75	820.9	372.3	F
250-025-750	1/4	.250	6.35	.750	19.05	.025	.64	.049	1.24	106.9	48.5	G
250-052-750	1/4	.250	6.35	.750	19.05	.052	1.32	.065	1.65	521.1	236.3	G
250-070-937	1/4	.250	6.35	.937	23.80	.070	1.78	.100	2.54	1868.9	847.6	G



BELLEVILLE SPRING WASHERS

SPECIAL INSTRUCTIONS FOR BELLEVILLE SPRING WASHERS

PRICING: See Inside Front Cover for 10 to 199 pricing. To price or order up to 1000 pcs. visit leespring.com; 1000+ pcs. contact Lee Spring.

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300 SERIES • Stainless Steel (Passivated)

LEE STOCK NUMBER	BOLT SIZE	INSIDE DIAMETER (ID)		OUTSIDE DIAMETER (OD)		THICKNESS (t)		OVERALL HEIGHT UNLOADED (Ho)		CALCULATED LOAD AT FLAT (Pmax)		PRICE GROUP
		IN.	MM	IN.	MM	IN.	MM	IN.	MM	LB.	KG	
312-024-625	5/16	.312	7.92	.625	15.88	.024	.61	.040	1.02	101.8	46.2	F
312-030-625	5/16	.312	7.92	.625	15.88	.030	.76	.044	1.12	173.9	78.9	F
312-031-625	5/16	.312	7.92	.625	15.88	.031	.76	.048	1.22	233.0	105.7	F
312-047-625	5/16	.312	7.92	.625	15.88	.047	1.19	.059	1.50	573.2	260.0	F
312-052-687	5/16	.312	7.92	.687	17.45	.052	1.32	.068	1.73	819.3	371.6	F
312-040-875	5/16	.312	7.92	.875	22.23	.040	1.02	.057	1.45	229.6	104.1	G
312-030-937	5/16	.312	7.92	.937	23.80	.030	.76	.060	1.52	147.9	67.1	G
312-045-937	5/16	.312	7.92	.937	23.80	.045	1.14	.067	1.70	366.1	166.1	G
312-070-937	5/16	.312	7.92	.937	23.80	.070	1.78	.094	2.39	1503.5	682.0	G
312-080-1000	5/16	.312	7.92	1.000	25.40	.080	2.03	.111	2.82	2533.9	1149.4	K
375-028-750	3/8	.375	9.53	.750	19.05	.028	.71	.042	1.07	98.3	44.6	G
375-030-750	3/8	.375	9.53	.750	19.05	.030	.76	.044	1.12	120.9	54.8	G
375-035-750	3/8	.375	9.53	.750	19.05	.035	.89	.055	1.40	274.2	124.4	G
375-038-750	3/8	.375	9.53	.750	19.05	.038	.97	.048	1.22	175.5	79.6	G
375-040-750	3/8	.375	9.53	.750	19.05	.040	1.02	.059	1.50	388.9	176.4	G
375-042-750	3/8	.375	9.53	.750	19.05	.042	1.07	.052	1.32	236.9	107.5	G
375-044-750	3/8	.375	9.53	.750	19.05	.044	1.12	.054	1.37	272.4	123.6	G
375-057-750	3/8	.375	9.53	.750	19.05	.057	1.45	.070	1.78	769.9	349.2	G
375-062-750	3/8	.375	9.53	.750	19.05	.062	1.57	.078	1.98	1219.4	553.1	G
375-080-1000	3/8	.375	9.53	1.000	25.40	.080	2.03	.109	2.77	2418.8	1099.7	G
375-078-1125	3/8	.375	9.53	1.125	28.58	.078	1.98	.097	2.46	1142.5	518.2	K
437-031-875	7/16	.437	11.10	.875	22.23	.031	.79	.059	1.50	195.9	88.8	G
437-042-875	7/16	.437	11.10	.875	22.23	.042	1.07	.062	1.57	347.9	157.8	G
437-035-1000	7/16	.437	11.10	1.000	25.40	.035	.89	.067	1.70	232.5	105.4	G
437-040-1000	7/16	.437	11.10	1.000	25.40	.040	1.02	.071	1.80	336.2	152.5	G
437-050-1000	7/16	.437	11.10	1.000	25.40	.050	1.27	.085	2.16	741.3	336.3	K
437-080-1000	7/16	.437	11.10	1.000	25.40	.080	2.03	.106	2.69	2255.6	1023.1	K
500-033-1000	1/2	.500	12.70	1.000	25.40	.033	.84	.052	1.32	122.8	55.7	G
500-035-1000	1/2	.500	12.70	1.000	25.40	.035	.89	.057	1.45	169.7	77.0	G
500-045-1000	1/2	.500	12.70	1.000	25.40	.045	1.14	.061	1.55	262.3	118.9	K
500-050-1000	1/2	.500	12.70	1.000	25.40	.050	1.27	.075	1.91	562.1	254.9	K
500-073-1000	1/2	.500	12.70	1.000	25.40	.073	1.85	.091	2.31	1259.6	571.2	K
500-080-1000	1/2	.500	12.70	1.000	25.40	.080	2.03	.103	2.62	2118.3	960.7	K
500-030-1375	1/2	.500	12.70	1.375	34.93	.030	.76	.066	1.68	83.3	37.8	L
500-032-1375	1/2	.500	12.70	1.375	34.93	.032	.81	.070	1.78	106.7	48.4	L
500-047-1500	1/2	.500	12.70	1.500	38.10	.047	1.19	.093	2.36	340.4	154.4	R
500-070-1500	1/2	.500	12.70	1.500	38.10	.070	1.78	.104	2.64	831.2	377.0	R
500-080-1500	1/2	.500	12.70	1.500	38.10	.080	2.03	.098	2.49	656.9	297.9	R
531-062-1125	17/32	.531	13.49	1.125	28.58	.062	1.57	.083	2.11	690.9	313.3	K
531-062-1250	17/32	.531	13.49	1.250	31.75	.062	1.57	.092	2.34	768.2	348.4	K
531-078-1250	17/32	.531	13.49	1.250	31.75	.078	1.98	.103	2.62	1274.7	578.1	K
562-038-1125	9/16	.562	14.27	1.125	28.58	.038	.97	.073	1.85	272.8	123.8	K
562-057-1125	9/16	.562	14.27	1.125	28.58	.057	1.45	.084	2.13	710.3	322.2	K

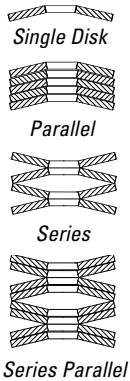
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		IN.	MM	IN.	MM	IN.	MM	IN.	MM	LB.	KG	
625-050-1125	5/8	.625	15.88	1.125	28.58	.050	1.27	.068	1.73	343.2	155.7	L
625-040-1250	5/8	.625	15.88	1.250	31.75	.040	1.02	.082	2.08	309.5	140.3	L
625-062-1250	5/8	.625	15.88	1.250	31.75	.062	1.57	.092	2.34	823.1	373.3	L
625-050-1375	5/8	.625	15.88	1.375	34.93	.050	1.27	.095	2.41	511.5	232.0	N
625-062-1375	5/8	.625	15.88	1.375	34.93	.062	1.57	.110	2.79	1040.3	471.8	N
625-078-1375	5/8	.625	15.88	1.375	34.93	.078	1.98	.100	2.54	949.4	430.6	N
625-062-1625	5/8	.625	15.88	1.625	41.28	.062	1.57	.084	2.13	325.0	147.4	R
625-057-1875	5/8	.625	15.88	1.875	47.63	.057	1.45	.115	2.92	490.0	222.2	R
750-040-1500	3/4	.750	19.05	1.500	38.10	.040	1.02	.068	1.73	143.3	65.0	R
750-045-1500	3/4	.750	19.05	1.500	38.10	.045	1.14	.093	2.36	349.7	158.6	R
875-057-1750	7/8	.875	22.23	1.750	44.45	.057	1.45	.114	2.90	620.0	281.2	R
1000-065-2000	1	1.000	25.40	2.000	50.80	.065	1.65	.130	3.30	802.7	364.1	R
1000-078-2000	1	1.000	25.40	2.000	50.80	.078	1.98	.138	3.51	1280.4	580.7	R
1000-078-2375	1	1.000	25.40	2.375	60.33	.078	1.98	.157	3.99	1112.8	504.7	AB
1125-073-2250	1 1/8	1.125	28.58	2.250	57.15	.073	1.85	.148	3.76	1036.7	470.2	AB
1250-080-2500	1 1/4	1.250	31.75	2.500	63.50	.080	2.03	.160	4.06	1178.9	534.6	AB



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