

BELLEVILLE SPRING WASHERS

Stock sizes in high-carbon and stainless steels

Belleville spring washers are especially suited for applications requiring high loads in small spaces. By combining them in varying sequences, each size gives numerous load-carrying possibilities. These washers have had all set removed during the manufacturing process.

Material

Spring Steel

Commercial 1074 - Certified to ASTM-A684

Stainless Steel (Parts with suffix "S")

Thicknesses (t) up to and including 0.072 in (1.83 mm):

- Commercial - Type 302,
- Government AMS 5906 type 302 (Chemistry only).

Thicknesses (t) over 0.072 in (1.83 mm):

- Commercial - Type 17-7 PH certified to AMS 5528.

Certificate of compliance available upon request. Certificate of chemical analysis available at extra cost.

Load and Deflection

Typical load-deflection curves for three characteristic proportions of washers listed are shown in Figure 1 below. From them, loads at intermediate heights may be estimated. The nominal amount of dish or cone (h) is found by subtracting "t" from "H".

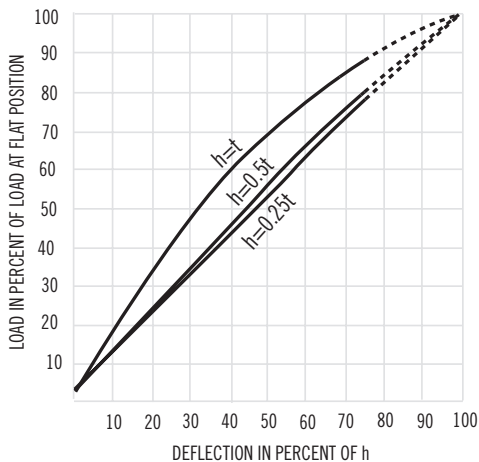


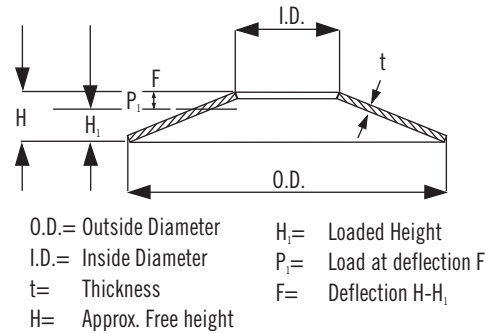
Figure 1

EXAMPLE: Using part B1250-040, estimate the load at 75% deflection.

$$h = H - t = 0.082 \text{ in. (2.08 mm)} - 0.040 \text{ (1.02 mm)} = 0.042 \text{ (1.07 mm)}; h/t = 0.042/0.040 \sim 1$$

From Fig. 1, using the curve "h = t", the load at 75% of the deflection is approximately 87% of the load at flat position. From the tables (see following pages), calculated load at flat is 330 lbs (1,468 N). $0.87 \times 330 = 287 \text{ lbs (1,277 N)}$.

The typical curves in Fig. 1 are shown with dotted lines beyond 75% of deflection to indicate that load characteristics in this area are not reliable because of partial bottoming of the washers.

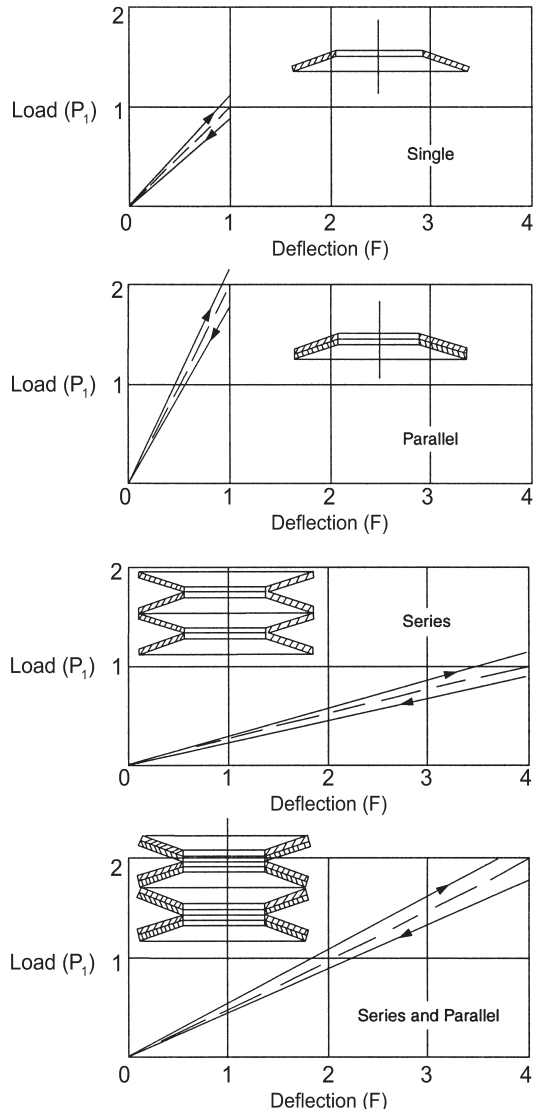


Stacked Spring Washers

Additional load or deflection can be obtained by stacking spring washers in series or in parallel. See charts below.

Contact our engineering department for tolerances.

Shown below are the comparative force/deflection graphs for the alternative methods of stacking.



BELLEVILLE SPRING WASHERS

Catalog Number*	Free Fit over Rod Ø			Minimum I.D.		Maximum O.D.		Free Fit in Hole Ø			Stock Thickness (t)		Free Height (H) Approximate		Loaded Height (H _l)		Load at H _l (P _l) (Min./Max.)		Ref. Load at Flat Position (P)	
	in	in	mm	in	mm	in	mm	in	in	mm	in	mm	in	mm	in	mm	lb	N	lb	N
B0187-007											0.0065	0.17	0.013	0.33	0.010	0.25	5.7-7.8	25.4-34.7	9.9	44
B0187-007-S	3/32	0.093	2.36	0.093	2.36	0.187	4.75	3/16	0.1875	4.76	0.0065	0.17	0.013	0.33	0.010	0.25	5.7-7.8	25.4-34.7	9.9	44
B0187-010											0.010	0.25	0.015	0.38	0.013	0.32	13-17.6	57.8-78.3	27.8	124
B0187-010-S											0.010	0.25	0.015	0.38	0.013	0.32	13-17.6	57.8-78.3	27.8	124
B0250-009											0.0086	0.22	0.017	0.44	0.013	0.33	9.9-13.5	44-60.1	16.9	75
B0250-009-S											0.0086	0.22	0.017	0.44	0.013	0.33	9.9-13.5	44-60.1	16.9	75
B0250-013	1/8	0.125	3.18	0.125	3.18	0.250	6.35	1/4	0.250	6.35	0.0133	0.34	0.020	0.51	0.017	0.43	22-30	97.9-133.5	48	214
B0250-013-S											0.0133	0.34	0.020	0.51	0.017	0.43	22-30	97.9-133.5	48	214
B0375-019						0.375	9.53	3/8	0.375	9.53	0.0185	0.47	0.028	0.71	0.023	0.58	35.3-47.7	156.7-211.8	73	325
B0281-010											0.010	0.25	0.020	0.51	0.015	0.38	12.8-17.3	56.8-76.8	23	102
B0281-013											0.013	0.33	0.021	0.53	0.017	0.43	20.8-28.2	92.5-125.4	43	191
B0281-015	#6	0.138	3.51	0.138	3.51	0.281	7.14	9/32	0.281	7.14	0.015	0.38	0.023	0.58	0.019	0.48	28.5-38.5	124.3-173.2	62	276
B0281-015-S											0.015	0.38	0.023	0.58	0.019	0.48	28.5-38.5	126.8-171.2	62	276
B0437-022						0.437	11.10	7/16	0.438	11.13	0.022	0.56	0.032	0.81	0.027	0.69	46.8-63.3	208.2-281.6	99	440
B0312-011											0.0108	0.27	0.022	0.55	0.016	0.41	15.8-21.4	70.3-95.2	27	120
B0312-011-S	5/32	0.156	3.97	0.156	3.96	0.312	7.92	5/16	0.313	7.95	0.0108	0.27	0.022	0.55	0.016	0.41	15.8-21.4	70.3-95.2	27	120
B0312-017											0.0166	0.42	0.025	0.64	0.021	0.53	35-48	155.7-214	75	334
B0312-017-S											0.0166	0.42	0.025	0.64	0.021	0.53	35-48	155.7-214	75	334
B0343-013											0.013	0.33	0.024	0.61	0.018	0.46	21.3-28.8	94.6-127.9	38	169
B0343-016											0.016	0.41	0.026	0.66	0.021	0.53	30.6-41.4	136.1-184.1	65	289
B0343-019	#8	0.164	4.17	0.164	4.17	0.343	8.71	11/32	0.344	8.74	0.0185	0.47	0.028	0.71	0.023	0.58	43-68	191.3-302.5	93	414
B0343-019-S											0.0185	0.47	0.028	0.71	0.023	0.58	43-68	191.3-302.5	93	414
B0499-025						0.500	12.70	1/2	0.500	12.70	0.025	0.64	0.037	0.94	0.031	0.79	61.6-83.4	274-371	131	583
B0375-015											0.015	0.38	0.027	0.69	0.021	0.53	29-40	129-177.9	55	245
B0375-015-S											0.0150	0.38	0.027	0.69	0.021	0.53	29-40	129-177.9	55	245
B0375-018											0.0175	0.44	0.028	0.71	0.023	0.58	39.1-52.9	173-236	81	360
B0375-020	3/16	0.188	4.78	0.190	4.83	0.375	9.53	3/8	0.375	9.53	0.020	0.51	0.030	0.76	0.025	0.64	51-69	227-307	110	489
B0375-020-S											0.020	0.51	0.030	0.76	0.025	0.64	51-69	227-307	110	489
B0375-030											0.030	0.76	0.036	0.91	0.033	0.84	106-144	471.5-640.6	233	1036
B0562-019						0.562	14.27	9/16	0.563	14.30	0.019	0.48	0.037	0.94	0.028	0.71	38.3-51.8	169-231	67	298
B0562-028											0.028	0.71	0.042	1.07	0.035	0.89	74-100	329-445	163	725
B0437-016											0.016	0.41	0.031	0.79	0.023	0.58	34-46	151.2-205	60	267
B0437-016-S											0.016	0.41	0.031	0.79	0.023	0.58	34-46	151.2-205	60	267
B0437-020	#12	0.216	5.49	0.220	5.59	0.437	11.10	7/16	0.438	11.13	0.020	0.51	0.032	0.81	0.026	0.66	48.5-65.6	213-393	98	436
B0437-023											0.023	0.58	0.034	0.86	0.029	0.74	64.6-87.4	289-396	139	618
B0687-034						0.687	17.45	11/16	0.688	17.48	0.034	0.86	0.050	1.27	0.042	1.07	106-144	471-641	229	1019
B0500-018											0.018	0.46	0.034	0.86	0.026	0.66	38-52	169-231	70	311
B0500-018-S											0.018	0.46	0.034	0.86	0.026	0.66	38-52	169-231	70	311
B0500-022											0.0215	0.55	0.036	0.91	0.029	0.74	55-77	245-343	115	512
B0500-022-S											0.0215	0.55	0.036	0.91	0.029	0.74	55-77	245-343	115	512
B0500-025											0.025	0.64	0.038	0.97	0.031	0.79	80-110	356-489	160	712
B0500-025-S	1/4	0.250	6.35	0.255	6.48	0.500	12.70	1/2	0.500	12.70	0.025	0.64	0.038	0.97	0.031	0.79	80-110	356-489	160	712
B0500-038											0.038	0.97	0.047	1.19	0.043	1.09	161-219	716-974	400	1779
B0500-038-S											0.038	0.97	0.047	1.19	0.043	1.09	161-219	716-974	400	1779
B0637-032						0.637	16.18	41/64	0.641	16.28	0.032	0.81	0.048	1.22	0.040	1.02	100-136	444-605	222	988
B0750-025											0.025	0.64	0.049	1.24	0.037	0.94	65-89	289-395	114	507
B0750-036						0.750	19.05	3/4	0.750	19.05	0.036	0.91	0.054	1.37	0.045	1.14	125-169	555-750	261	1161
B0750-052											0.052	1.32	0.065	1.65	0.058	1.47	264-358	1174-1592	560	2491
B0625-022											0.022	0.56	0.042	1.07	0.032	0.81	59-81	262-360	105	467
B0625-022-S											0.022	0.56	0.042	1.07	0.032	0.81	59-81	262-360	105	467
B0625-032						0.625	15.88	5/8	0.625	15.88	0.032	0.81	0.048	1.22	0.040	1.02	123-167	547-743	260	1157
B0625-032-S											0.032	0.81	0.048	1.22	0.040	1.02	123-167	547-743	260	1157
B0625-047	5/16	0.3125	7.94	0.317	8.05						0.047	1.19	0.059	1.50	0.053	1.35	255-345	1134-1535	600	2669
B0625-047-S											0.047	1.19	0.059	1.50	0.053	1.35	255-345	1134-1535	600	2669
B0937-030											0.030	0.76	0.060	1.52	0.045	1.14	93.5-127	415.9-564.9	159	707
B0937-045						0.937	23.80	15/16	0.938	23.83	0.045	1.14	0.067	1.70	0.056	1.42	185-251	823-1117	395	1757
B0937-045-S											0.045	1.14	0.067	1.70	0.056	1.42	185-251	823-1117	395	1757
B0750-028											0.028	0.71	0.051	1.30	0.039	0.99	93-127	414-565	175	778
B0750-028-S											0.028	0.71	0.051	1.30	0.039	0.99	93-127	414-565	175	778
B0750-034											0.034	0.86	0.055	1.40	0.044	1.12	141-191	627-850	282	1254
B0750-034-S	3/8	0.375	9.53	0.380	9.65	0.750	19.05	3/4	0.750	19.05	0.034	0.86	0.055	1.40	0.044	1.12	141-191	627-850	282	1254
B0750-040											0.040	1.02	0.059	1.50	0.049	1.24	199-271	885-1205	415	1846
B0750-040-S											0.040	1.02	0.059	1.50	0.049	1.24	199-271	885-1205	415	1846
B0750-056											0.056	1.42	0.070	1.78	0.063	1.60	365-495	1624-2202	845	3759

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* Numbers with the suffix "S" are stainless steel.

BELLEVILLE SPRING WASHERS

Catalog Number*	Free Fit over Rod Ø			Minimum I.D.		Maximum O.D.		Free Fit in Hole Ø			Stock Thickness (t)		Free Height (H) Approximate		Loaded Height (H _L)		Load at H _L (P _L) (Min./Max.)		Ref. Load at Flat Position (P)	
	in	in	mm	in	mm	in	mm	in	in	mm	in	mm	in	mm	in	mm	lb	N	lb	N
B0750-056-S						0.750	19.05	3/4	0.750	19.05	0.056	1.42	0.070	1.78	0.063	1.60	365-495	1624-2202	845	3759
B0950-047						0.950	24.13	61/64	0.953	24.21	0.047	1.19	0.070	1.78	0.058	1.47	222-300	986-1334	463	2060
B1125-053	3/8	0.375	9.53	0.380	9.65						0.053	1.35	0.080	2.03	0.066	1.68	254-344	1128-1530	535	2380
B1125-053-S						1.125	28.58	1 1/8	1.125	28.58	0.053	1.35	0.080	2.03	0.066	1.68	254-344	1128-1530	535	2380
B1125-078											0.078	1.98	0.097	2.46	0.088	2.24	507-687	2251-3056	1235	5494
B0875-031											0.031	0.79	0.059	1.50	0.045	1.14	114-156	507-694	205	912
B0875-031-S	7/16	0.4375	11.11	0.442	11.23	0.875	22.23	7/8	0.875	22.23	0.031	0.79	0.059	1.50	0.045	1.14	114-156	507-694	205	912
B0875-045											0.045	1.14	0.067	1.70	0.056	1.42	229-311	1018-1383	495	2202
B0875-045-S											0.045	1.14	0.067	1.70	0.056	1.42	229-311	1018-1383	495	2202
B1000-035											0.035	0.89	0.067	1.70	0.051	1.30	148-202	658-899	260	1157
B1000-035-S											0.035	0.89	0.067	1.70	0.051	1.30	148-202	658-899	260	1157
B1000-043											0.043	1.09	0.071	1.80	0.057	1.45	213-288	943-1281	431	1917
B1000-043-S						1.000	25.40	1	1.000	25.40	0.043	1.09	0.071	1.80	0.057	1.45	212-288	943-1281	431	1917
B1000-050											0.050	1.27	0.075	1.91	0.062	1.57	289-391	1286-1739	600	2669
B1000-050-S											0.050	1.27	0.075	1.91	0.062	1.57	289-391	1286-1739	600	2669
B1000-073	1/2	0.500	12.70	0.505	12.83						0.073	1.85	0.091	2.31	0.082	2.08	573-777	2549-3456	1335	5938
B1000-073-S											0.073	1.85	0.091	2.31	0.082	2.08	573-777	2549-3456	1335	5938
B1262-060						1.262	32.05	1 17/64	1.266	32.16	0.060	1.52	0.091	2.31	0.075	1.91	348-470	1548-2091	731	3252
B1500-047											0.047	1.19	0.093	2.36	0.070	1.78	213-289	947-1285	366	1628
B1500-070						1.500	38.10	1 1/2	1.500	38.10	0.070	1.78	0.104	2.64	0.087	2.21	420-570	1868-2535	896	3986
B1500-070-S											0.070	1.78	0.104	2.64	0.087	2.21	420-570	1868-2535	896	3986
B1500-102											0.102	2.59	0.128	3.25	0.115	2.92	883-1195	3928-5316	2060	9163
B1125-038											0.038	0.97	0.073	1.85	0.055	1.40	165-225	733-1001	285	1268
B1125-038-S	9/16	0.5625	14.29	0.567	14.40	1.125	28.58	1 1/8	1.125	28.58	0.038	0.97	0.073	1.85	0.055	1.40	165-225	733-1001	285	1268
B1125-056											0.056	1.42	0.084	2.13	0.070	1.78	344-466	1530-2073	735	3269
B1125-056-S											0.056	1.42	0.084	2.13	0.070	1.78	344-466	1530-2073	735	3269
B1250-040											0.040	1.02	0.082	2.08	0.061	1.55	196-265	867-1179	330	1468
B1250-040-S											0.040	1.02	0.082	2.08	0.061	1.55	195-265	867-1179	330	1468
B1250-051											0.051	1.30	0.087	2.21	0.069	1.75	306-374	1361-1664	582	2589
B1250-062						1.250	31.75	1 1/4	1.250	31.75	0.062	1.57	0.092	2.34	0.077	1.96	403-547	1793-2433	870	3870
B1250-062-S											0.062	1.57	0.092	2.34	0.077	1.96	403-547	1793-2433	870	3870
B1250-089	5/8	0.625	15.88	0.630	16.00						0.089	2.26	0.111	2.82	0.100	2.54	833-1127	3705-5013	1914	8514
B1250-089-S											0.089	2.26	0.111	2.82	0.100	2.54	833-1127	3705-5013	1914	8514
B1875-057											0.057	1.45	0.115	2.92	0.085	2.16	333-407	1481-1810	522	2322
B1875-086						1.875	47.63	1 7/8	1.875	47.63	0.086	2.18	0.129	3.28	0.107	2.72	620-840	2758-3737	1319	5867
B1875-086-S											0.086	2.18	0.129	3.28	0.107	2.72	620-840	2758-3737	1319	5867
B1875-127											0.127	3.23	0.158	4.01	0.142	3.61	1399-1893	5223-8420	3105	13812
B1375-044											0.044	1.12	0.088	2.24	0.065	1.65	225-305	1001-1357	375	1668
B1375-044-S	11/16	0.6875	17.46	0.692	17.58	1.375	34.93	1 3/8	1.375	34.93	0.044	1.12	0.088	2.24	0.065	1.65	225-305	1001-1357	375	1668
B1375-067											0.067	1.70	0.101	2.57	0.084	2.13	508-622	2260-2767	1025	4559
B1500-045											0.045	1.14	0.093	2.36	0.069	1.75	241-327	1072-1450	400	1779
B1500-045-S											0.045	1.14	0.093	2.36	0.069	1.75	241-326	1072-1450	400	1779
B1500-060											0.060	1.52	0.102	2.59	0.081	2.06	387-523	1721-2326	774	3443
B1500-062-S						1.500	38.10	1 1/2	1.500	38.10	0.062	1.57	0.107	2.72	0.081	2.06	364-546	1618-2428	774	3443
B1500-072											0.072	1.83	0.107	2.72	0.089	2.26	565-765	2513-3403	1180	5249
B1500-072-S	3/4	0.750	19.05	0.755	19.18						0.072	1.83	0.107	2.72	0.089	2.26	565-765	2513-3403	1180	5249
B1500-107											0.107	2.72	0.134	3.40	0.121	3.07	1190-1610	5293-7162	2833	12602
B1500-107-S											0.107	2.72	0.134	3.40	0.121	3.07	1190-1610	5293-7162	2833	12602
B2250-068											0.068	1.73	0.137	3.48	0.103	2.62	463-553	2059-2460	732	3256
B2250-102						2.250	57.15	2 1/4	2.250	57.15	0.102	2.59	0.153	3.89	0.127	3.23	910-1113	4048-4951	1822	8105
B2250-150											0.150	3.81	0.188	4.78	0.169	4.29	1853-2509	8242-11161	4295	19105
B1750-057											0.057	1.45	0.114	2.90	0.085	2.16	382-518	1699-2304	650	2891
B1750-057-S	7/8	0.875	22.23	0.880	22.35	1.750	44.45	1 3/4	1.750	44.45	0.057	1.45	0.114	2.90	0.085	2.16	382-518	1699-2304	650	2891
B1750-085											0.085	2.16	0.128	3.25	0.106	2.69	715-1105	3180-4915	1630	7251
B1750-085-S											0.085	2.16	0.128	3.25	0.106	2.69	600-1220	2668-5427	1630	7251
B2000-065											0.065	1.65	0.130	3.30	0.098	2.49	502-679	2233-3020	860	3825
B2000-065-S											0.065	1.65	0.130	3.30	0.098	2.49	502-679	2233-3020	860	3825
B2000-084											0.084	2.13	0.136	3.45	0.110	2.79	727-983	3322-4372	1488	6619
B2000-097	1	1.000	25.40	1.000	25.40	2.000	50.80	2	2.000	50.80	0.097	2.46	0.145	3.68	0.121	3.07	1002-1358	4457-6041	2140	9519
B2000-097-S											0.097	2.46	0.145	3.68	0.121	3.07	1002-1358	4457-6041	2140	9519
B2000-142											0.142	3.61	0.177	4.50	0.160	4.06	2048-2772	9110-12330	4824	21458
B3000-090						3.000	76.20	3	3.000	76.20	0.090	2.29	0.180	4.57	0.135	3.43	727-983	3234-4372	1244	5534
B3000-135											0.135	3.43	0.202	5.13	0.168	4.27	1548-1893	6886-8420	3118	13870
B2250-073	1 1/8	1.125	28.58	1.125	28.58	2.250	57.15	2 1/4	2.250	57.15	0.073	1.85	0.148	3.76	0.113	2.87	621-840	2762-3736	1100	4893



SPEC

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* Numbers with the suffix "S" are stainless steel.

BELLEVILLE SPRING WASHERS																				
Catalog Number*	Free Fit over Rod Ø			Minimum I.D.		Maximum O.D.		Free Fit in Hole Ø			Stock Thickness (t)		Free Height (H) Approximate		Loaded Height (H _L)		Load at H _L (P _L) (Min./Max.)		Ref. Load at Flat Position (P)	
	in	in	mm	in	mm	in	mm	in	in	mm	in	mm	in	mm	in	mm	lb	N	lb	N
B2250-111	1 1/8	1.125	28.58	1.125	28.58	2.250	57.15	2 1/4	2.250	57.15	0.111	2.82	0.165	4.19	0.139	3.53	1241-1679	5520-7468	2780	12366
B2250-159											0.159	4.04	0.198	5.03	0.179	4.55	2550-3460	11343-15390	5973	26569
B2500-080											0.080	2.03	0.160	4.06	0.120	3.05	739-1000	3287-4448	1260	5605
B2500-080-S											0.080	2.03	0.160	4.06	0.120	3.05	739-1000	3287-4448	1260	5605
B2500-120											0.120	3.05	0.180	4.57	0.150	3.81	1496-2024	6655-9003	3200	14234
B2500-120-S	1 1/4	1.250	31.75	1.250	31.75	2.500	63.50	2 1/2	2.500	63.50	0.120	3.05	0.180	4.57	0.150	3.81	1469-2024	6655-9003	3200	14234
B2500-175											0.175	4.45	0.219	5.56	0.197	5.00	3085-4175	13722-18571	7149	31800
B3750-168						3.750	95.25	3 3/4	3.750	95.25	0.168	4.27	0.251	6.38	0.209	5.31	2348-2870	10444-12766	4754	21147
B2750-087	1 3/8	1.375	34.93	1.375	34.93	2.750	69.85	2 3/4	2.750	69.85	0.087	2.21	0.173	4.39	0.132	3.35	816-1104	3630-4911	1440	6405
B2750-132											0.132	3.35	0.196	4.98	0.165	4.19	1658-2243	7375-9977	3210	14279
B3000-093	1 1/2	1.500	38.10	1.500	38.10	3.000	76.20	3	3.000	76.20	0.093	2.36	0.189	4.80	0.143	3.63	944-1277	4199-5681	1630	7251
B3000-143											0.143	3.63	0.213	5.41	0.180	4.57	2052-2508	9127-11156	4380	19483
B4000-125	2	2.000	50.80	2.000	50.80	4.000	101.60	4	4.000	101.60	0.125	3.18	0.250	6.35	0.187	4.75	1709-2312	7602-10284	2910	12944
B4000-187											0.187	4.75	0.280	7.11	0.233	5.92	3409-4612	15163-20514	7280	32383

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