

# CLOVER® DOME SPRING WASHERS

## Stock Sizes in stainless steel

Clover® Dome spring washers are well suited for applications where a belleville washer or disc spring does not provide adequate deflection, or where the load obtained from a wave washer is not sufficient for the application. By combining washers in varying sequences, each size provides multiple load-carrying or deflection possibilities. These washers have had the set removed during the manufacturing process.

## Material

Stainless Steel Type 17-7 PH - Chemistry per AMS 5529  
Carbon Steel SAE 1070 to SAE 1074 (based on availability at time of manufacture) .  
Certificate of compliance available upon request.  
Certificate of chemical analysis available at extra cost.

## Load and Deflection

Typical load-deflection curves for four 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".

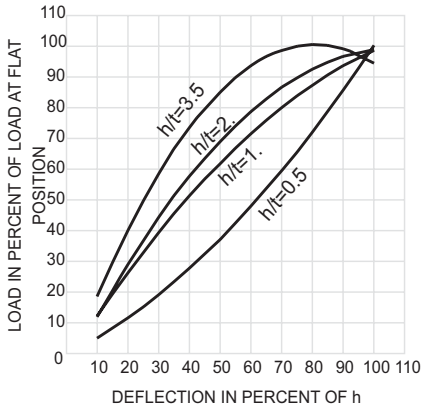
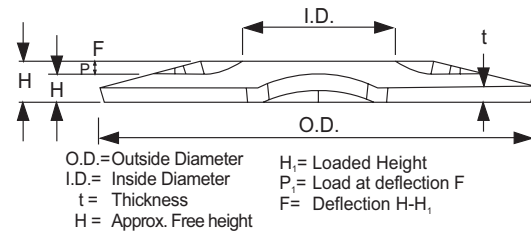


Figure 1

**EXAMPLE:** Using part BC-0709-015-S, estimate the load at 50% deflection.  $h/t = .052 / .015 \sim 3.5$ .

From Figure 1 above, using the curve for  $h/t = 3.5$ , the load at 50% of the deflection is approximately 85% of the load at flat position. From the table (see following page), the load at flat is 27 lbs. To calculate the load at 50%,  $27 \text{ lbs} \times .85 = 22.95 \text{ lbs}$ .

The typical curves in Figure 1 show deflections beyond 75%. The area beyond 75% deflection should be avoided due to the partial bottoming of the Clover® Dome and excessive stress concentrations above 75% deflection.

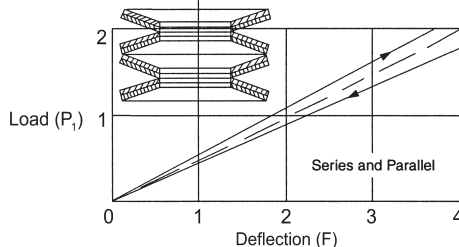
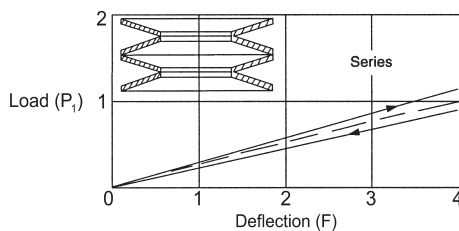
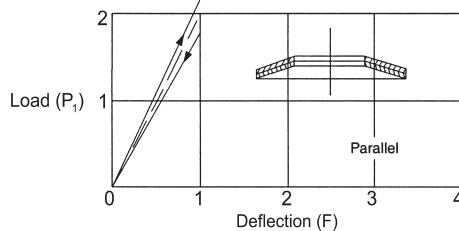
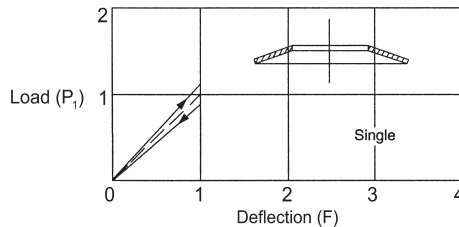


## Stacked Clover® Dome Washers

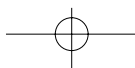
Additional load of deflection can be obtained by stacking washers in series or in parallel. See charts below.

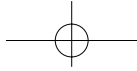
Contact our engineering department for tolerances.

Shown below are comparative force/deflection graphs by alternate methods of stacking.



US Patent #5,269,499. Patents pending outside USA.





## CLOVER® DOME 弹簧垫圈

### 不锈钢材质的常备元件

Clover® Dome 弹簧垫圈可广泛用于贝勒维尔垫圈或碟形弹簧不能提供充分变形量，或者波状弹簧垫圈不能提供足够载荷的场合。通过改变碟片数量或者碟片的组合形式，可以得到不同的承载能力和特性曲线。在制造过程中需进行强压处理。

### 材质

不锈钢 17-7 PH - 化学性质符合 AMS 5529  
SAE 1070-1074 碳钢（牌号以生产时的供货为准）  
根据客户要求提供产品合格证书。  
客户要求化学分析证书，需支付额外费用。

### 载荷与变形量

图1（见下）列出了四种 Clover® Dome 弹簧垫圈的载荷-变形量特性曲线。根据这些曲线，可估算出变形量为50%时垫圈的承载载荷。内锥高度的公称值h等于垫圈自由高度H减去垫圈的厚度t。

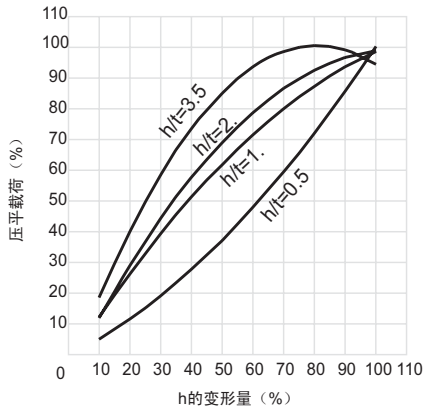
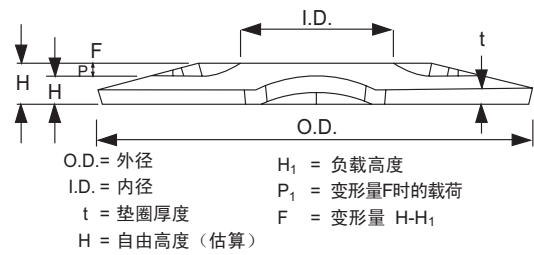


图 1

以部件BC-0709-015-S为例，估算50%变形量时的载荷。  
 $h/t = .052 / .015 \sim 3.5$ 。

在图1（见上）中，根据 $h/t = 3.5$ 的对应曲线，50%变形量时的载荷约为压平载荷得85%。根据第135页的表格查得，压平载荷为27 lbs。则50%变形量时的载荷为  $27 \text{ lbs} \times .85 = 22.95 \text{ lbs}$ 。

图1（见上）中的典型曲线说明了75%以下变形量的情况。由于 Clover® Dome 在75%以上变形量时有部分下垂以及过度应力集中，应避免变形量在75%以上的应用场合。



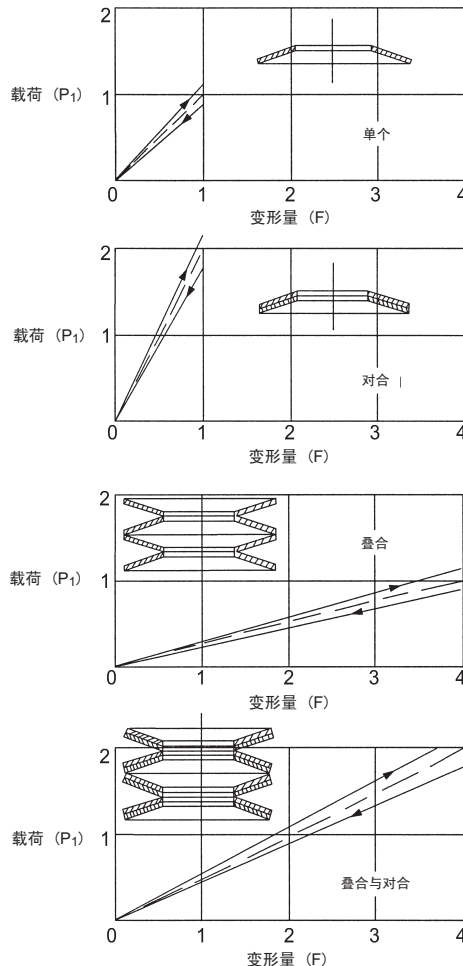
O.D. = 外径  
I.D. = 内径  
t = 垫圈厚度  
H = 自由高度（估算）  
 $H_1$  = 负载高度  
 $P_1$  = 变形量F时的载荷  
F = 变形量  $H - H_1$

### 堆叠式Clover® Dome 弹簧垫圈

通过对合或叠合的方式堆叠垫圈，可得到更大的载荷或变形量，见下图。

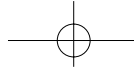
关于产品的具体尺寸公差，请联系我们的工程部门。

以下为不同堆叠方式的载荷/变形量的特性曲线图。

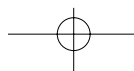


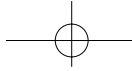
美国专利号 #5,269,499，国外专利申请中。

HENRY® [www.hlspring.com](http://www.hlspring.com)  
Tel +86-0511-8803-6999



CLOVER® DOME SPRING WASHERS CLOVER® DOME 弹簧垫圈																				
Catalog Number* 编号*	Free Fit over RodØ 轴配合直径 Ø			Minimum I.D. 最小内径		Maximum O.D. 最大外径		Free Fit in HoleØ 孔配合直径 Ø			Stock Thickness (t) 垫圈厚度(t)		Free Height (H) Approximate 自由高度 (H) (估算)		Loaded Height (H) 加载高度 (H)		Load at H <sub>i</sub> (P <sub>i</sub> ) (Min./Max.) H <sub>i</sub> 下的载荷(P <sub>i</sub> ) (最小/最大)		Ref. Load at Flat Position (P) 压平载荷 (P) (参考)	
	in	in	mm	in	mm	in	mm	in	in	mm	in	mm	in	mm	in	mm	lb	N	lb	N
BC0250-008-S	1/8	0.125	3.18	0.125	3.18	0.250	6.35	1/4	0.250	6.35	0.008	0.20	0.022	0.56	0.012	0.29	6.1 - 9.1	27.1 - 40.5	11	49
BC0250-012-S											0.012	0.30	0.026	0.66	0.016	0.39	17.6 - 26.3	78.3 - 117	34	151
BC0312-012-S	#6	0.138	3.51	0.143	3.63	0.312	7.92	5/16	0.313	7.95	0.012	0.30	0.032	0.81	0.017	0.43	18.3 - 27.5	81.4 - 122.4	23	102
BC0312-018-S											0.018	0.46	0.038	0.97	0.023	0.58	44.6 - 67	198 - 299	89	396
BC0343-014-S											0.014	0.36	0.034	0.86	0.019	0.48	23.9 - 35.9	106.3 - 159.7	35	156
BC0343-016-S	#8	0.164	4.17	0.169	4.29	0.343	8.71	11/32	0.344	8.74	0.016	0.41	0.036	0.91	0.021	0.53	26.7 - 40.1	118 - 179	52	231
BC0343-020-S											0.020	0.51	0.040	1.02	0.025	0.64	52.1 - 78.3	231 - 349	104	463
BC0375-010-S											0.010	0.25	0.031	0.79	0.015	0.39	10.8 - 16.4	48 - 73	10	44
BC0375-016-S											0.016	0.41	0.037	0.94	0.021	0.54	23.1 - 34.7	102 - 155	45	200
BC0375-018-S	#10	0.195	4.95	0.195	4.95	0.375	9.53	3/8	0.375	9.53	0.018	0.46	0.039	0.99	0.023	0.59	32.8 - 49.4	145 - 220	64	285
BC0375-020-S											0.020	0.51	0.041	1.04	0.025	0.64	45.1 - 67.8	200 - 302	90	400
BC0562-020-S						0.562	14.27	9/16	0.563	14.30	0.020	0.51	0.062	1.57	0.031	0.77	40.9 - 61.5	181 - 274	70	311
BC0562-030-S											0.030	0.76	0.072	1.83	0.041	1.03	138 - 208	613 - 926	272	1210
BC0437-018-S	#12	0.22	5.59	0.220	5.59	0.437	11.10	7/16	0.438	11.13	0.018	0.46	0.043	1.09	0.024	0.62	36 - 54	160.1-240.2	71	316
BC0437-022-S											0.022	0.56	0.047	1.19	0.028	0.72	81.7 - 122.6	363.4-545.4	163	725
BC0500-014-S											0.014	0.36	0.042	1.07	0.021	0.53	21.1 - 31.6	93.9 - 140.6	36	160
BC0500-018-S											0.018	0.46	0.046	1.17	0.025	0.64	28.7 - 43.1	127.7 - 191.7	50	222
BC0500-022-S	1/4	0.25	6.35	0.255	6.48	0.500	12.70	1/2	0.500	12.70	0.022	0.56	0.050	1.27	0.029	0.74	68.2 - 102.3	303.4-455.1	134	596
BC0500-026-S											0.026	0.66	0.054	1.37	0.033	0.84	89.4 - 134.1	397.7-596.5	179	796
BC0709-015-S											0.015	0.38	0.067	1.70	0.028	0.71	17.8 - 26.7	79.2 - 118.8	27	120
BC0709-020-S						0.709	18.01	23/32	0.719	18.26	0.020	0.51	0.072	1.83	0.033	0.84	33.9 - 50.9	151 - 226.4	56	249
BC0709-025-S											0.025	0.64	0.077	1.96	0.038	0.97	56.8 - 85.2	252.7 - 379	97	431
BC0625-018-S											0.018	0.46	0.054	1.37	0.027	0.69	25.3 - 38	112.5 - 169	44	196
BC0625-022-S				0.317	8.05	0.625	15.88	5/8	0.625	15.88	0.022	0.56	0.058	1.47	0.031	0.79	52.5 - 78.7	233.5-350.1	92	409
BC0625-030-S											0.030	0.76	0.066	1.68	0.039	0.99	140.7-211.5	626 - 940.6	277	1232
BC0625-033-S	5/16	0.313	7.95								0.033	0.84	0.069	1.75	0.042	1.07	152.3-228.4	677.5 - 1016	304	1352
BC0896-015-S											0.015	0.38	0.081	2.06	0.032	0.80	17.1 - 25.7	76.2 - 114.3	19	85
BC0896-020-S				0.320	8.13	0.896	22.76	29/32	0.906	23.02	0.020	0.51	0.086	2.18	0.037	0.93	31.9 - 47.8	141.9-212.8	47	209
BC0896-025-S											0.025	0.64	0.091	2.31	0.042	1.05	54.4 - 81.6	241.9-362.9	90	400
BC0750-022-S											0.022	0.56	0.065	1.65	0.033	0.83	46.2 - 69.3	205.5-308.3	79	351
BC0750-026-S											0.026	0.66	0.069	1.75	0.037	0.93	73.4 - 110.1	326.5-489.8	128	569
BC0750-030-S											0.030	0.76	0.073	1.85	0.041	1.04	103 - 154.5	458.2-687.3	202	899
BC0750-033-S	3/8	0.375	9.53	0.380	9.65	0.750	19.08	3/4	0.750	19.05	0.033	0.84	0.076	1.93	0.044	1.11	138 - 207	613.9-920.8	271	1205
BC0750-039-S											0.039	0.99	0.082	2.08	0.050	1.26	220.7 - 331	981.7-1472.4	440	1957
BC0750-043-S											0.043	1.09	0.086	2.18	0.054	1.37	297.6-446.4	1323.8-1985.7	594	2642
BC1070-020-S				0.400	10.16	1.069	27.15	1 7/64	1.100	28.00	0.020	0.51	0.097	2.46	0.039	1.00	31.9 - 47.8	141.8-212.7	47	209
BC1070-025-S											0.025	0.64	0.102	2.59	0.044	1.12	49.9 - 74.9	222.3-334.4	78	347
BC0875-030-S	7/16	0.438	11.13	0.442	11.23	0.875	22.25	7/8	0.875	22.23	0.030	0.76	0.080	2.03	0.043	1.08	92.1 - 138.2	409.7-614.7	161	716
BC0875-033-S											0.033	0.84	0.083	2.11	0.046	1.16	119 - 178.4	529.3-793.6	233	1036
BC1000-033-S											0.033	0.84	0.090	2.29	0.047	1.20	102.2-153.2	454.6-681.5	178	792
BC1000-037-S	1/2	0.5	12.70	0.505	12.83	1.000	25.43	1	1.000	25.40	0.037	0.94	0.094	2.39	0.051	1.30	151.1-226.7	672.1-1008.4	263	1170
BC1000-039-S											0.039	0.99	0.096	2.44	0.053	1.35	184.8-277.3	822 - 1233.5	362	1610
BC1000-043-S											0.043	1.09	0.100	2.54	0.057	1.45	254.2-381.2	1130.7-1695.7	498	2215





CLOVER® DOME SPRING WASHERS CLOVER® DOME 碳弹簧垫圈																				
Catalog Number* 编号*	Free Fit over RodØ 轴配合直径 Ø			Minimum I.D. 最小内径		Maximum O.D. 最大外径		Free Fit in HoleØ 孔配合直径 Ø			Stock Thickness (t) 垫圈厚度(t)		Free Height (H) 自由高度 (H) (估算)		Loaded Height (H <sub>L</sub> ) 负载高度 (H <sub>L</sub> )		Load at H <sub>L</sub> (P <sub>L</sub> ) (Min./Max.) H <sub>L</sub> 下的载荷(P <sub>L</sub> ) (最小/最大)		Ref. Load at Flat Position (P) 压平载荷 (P) (参考)	
	in	in	mm	in	mm	in	mm	in	in	mm	in	mm	in	mm	in	mm	lb	N	lb	N
BC0250-008-CA	0.110	0.110	2.79	0.118	3.00	0.250	6.35	1/4	0.250	6.35	0.008	0.20	0.022	0.57	0.011	0.29	4.5 - 6.7	19.8 - 29.7	8	36
BC0250-012-CA	1/8	0.125	3.18	0.125	3.18						0.012	0.30	0.026	0.66	0.015	0.39	22.1 - 33.2	98.5 - 147.7	40	177
BC0312-012-CA	#6	0.138	3.51	0.143	3.63	0.312	7.92	5/16	0.313	7.95	0.012	0.30	0.031	0.78	0.017	0.43	21.9 - 32.8	97.2 - 145.9	36	159
BC0312-018-CA						0.320	8.13	21/64	0.328	8.20	0.018	0.46	0.031	0.80	0.023	0.58	36.9 - 55.3	164.1 - 246.2	57	252
BC0343-014-CA											0.014	0.35	0.031	0.80	0.019	0.48	27.4 - 41.1	121.9 - 182.8	59	262
BC0343-016-CA	#8	0.164	4.17	0.169	4.29	0.343	8.71	11/32	0.344	8.74	0.016	0.41	0.032	0.81	0.021	0.53	36.2 - 54.4	161.2 - 241.8	72	319
BC0343-020-CA											0.020	0.51	0.033	0.84	0.025	0.64	40.3 - 60.4	179.1 - 268.6	78	348
BC0375-010-CA											0.010	0.25	0.031	0.80	0.015	0.38	11.3 - 17.0	50.4 - 75.6	13	59
BC0375-016-CA											0.016	0.41	0.032	0.82	0.021	0.54	37.2 - 55.7	165.3 - 247.9	83	368
BC0375-018-CA	#10	0.190	4.83	0.190	4.95	0.380	9.65	25/64	0.391	9.93	0.018	0.46	0.033	0.83	0.023	0.59	40.0 - 60.0	177.8 - 266.7	68	303
BC0375-020-CA											0.020	0.51	0.032	0.82	0.025	0.64	54.0 - 80.9	240.0 - 360.0	67	296
BC0562-020-CA						0.562	14.27	9/16	0.563	14.30	0.020	0.51	0.056	1.42	0.030	0.77	34.1 - 51.2	151.9 - 227.9	58	259
BC0562-030-CA											0.030	0.76	0.060	1.52	0.041	1.03	120.4 - 180.6	535.6 - 803.4	300	1334
BC0437-018-CA	#12	0.216	5.49	0.220	5.59	0.437	11.10	7/16	0.438	11.13	0.018	0.45	0.043	1.08	0.024	0.62	44.6 - 66.9	198.3 - 297.4	73	324
BC0437-022-CA											0.022	0.55	0.046	1.17	0.028	0.72	78.5 - 117.7	349.1 - 523.7	115	510
BC0500-014-CA											0.014	0.35	0.042	1.07	0.021	0.53	20.3 - 30.5	90.5 - 135.7	55	245
BC0500-018-CA											0.018	0.45	0.046	1.16	0.025	0.64	39.7 - 59.5	176.6 - 264.9	81	358
BC0500-022-CA	1/4	0.250	6.35	0.255	6.48	0.502	12.75	33/64	0.516	13.11	0.022	0.55	0.049	1.25	0.029	0.74	73.6 - 110.4	327.3 - 491.0	148	660
BC0500-026-CA											0.026	0.65	0.053	1.34	0.033	0.84	105.0 - 157.5	467.0 - 700.5	156	693
BC0709-015-CA											0.015	0.38	0.067	1.70	0.028	0.71	205.5 - 308.2	914.1 - 1371.1	463	2060
BC0709-020-CA						0.719	18.26	47/64	0.735	18.67	0.020	0.51	0.071	1.80	0.033	0.84	25.2 - 37.8	112.2 - 168.2	88	392
BC0709-025-CA											0.025	0.64	0.075	1.90	0.038	0.96	98.0 - 147.1	436.1 - 654.1	454	2021
BC0625-018-CA											0.018	0.45	0.054	1.36	0.027	0.69	31.5 - 47.2	140.1 - 210.1	95	422
BC0625-022-CA				0.317	8.05	0.630	16.00	41/64	0.641	16.28	0.022	0.55	0.057	1.45	0.031	0.79	56.4 - 84.6	250.8 - 376.1	168	746
BC0625-030-CA											0.030	0.75	0.064	1.63	0.039	0.99	133.7 - 200.5	594.6 - 891.9	291	1295
BC0625-033-CA	5/16	0.313	7.95								0.033	0.85	0.068	1.72	0.042	1.07	175.0 - 262.5	778.4 - 1167.5	364	1619
BC0896-015-CA											0.015	0.38	0.084	2.13	0.031	0.80	15.3 - 23.0	68.1 - 102.2	39	172
BC0896-020-CA				0.32	8.13	0.905	22.99	29/32	0.906	23.02	0.020	0.51	0.089	2.26	0.037	0.94	26.5 - 39.8	118.0 - 176.9	77	343
BC0896-025-CA											0.025	0.64	0.093	2.36	0.042	1.07	54.1 - 81.2	240.8 - 361.2	313	1391
BC0750-022-CA											0.022	0.55	0.065	1.64	0.033	0.83	56.9 - 85.4	253.3 - 380.0	161	716
BC0750-026-CA											0.026	0.65	0.068	1.73	0.050	1.26	61.1 - 91.7	271.9 - 407.9	187	834
BC0750-030-CA											0.030	0.75	0.072	1.82	0.041	1.04	122.3 - 183.5	544.2 - 816.3	287	1275
BC0750-033-CA	3/8	0.375	9.53	0.380	9.65	0.760	19.30	49/64	0.766	19.46	0.033	0.85	0.075	1.91	0.044	1.11	175.9 - 263.9	782.5 - 1173.7	412	1834
BC0750-039-CA											0.039	1.00	0.081	2.05	0.050	1.26	183.4 - 275.1	815.7 - 1223.5	514	2286
BC0750-043-CA											0.043	1.10	0.084	2.14	0.054	1.37	328.8 - 493.3	1462.8 - 2194.2	739	3286
BC1070-020-CA				0.400	10.16	1.069	27.15	1 7/64	1.110	28.19	0.020	0.51	0.099	2.51	0.040	1.01	28.7 - 43.0	127.6 - 191.4	84	373
BC1070-025-CA											0.025	0.64	0.100	2.54	0.044	1.12	41.0 - 61.5	182.5 - 273.7	249	1109
BC0875-030-CA	7/16	0.438	11.13	0.442	11.23	0.879	22.33	57/64	0.891	22.63	0.030	0.75	0.080	2.02	0.043	1.08	110.1 - 165.2	489.8 - 734.7	260	1157
BC0875-033-CA											0.033	0.85	0.083	2.11	0.046	1.16	132.7 - 199.0	590.2 - 885.3	237	1055
BC1000-033-CA											0.033	0.85	0.091	2.30	0.047	1.20	131.0 - 196.5	582.7 - 874.0	384	1709
BC1000-037-CA	1/2	0.500	12.70	0.505	12.83	1.005	25.53	1 1/64	1.016	25.80	0.037	0.95	0.094	2.39	0.051	1.30	164.8 - 247.2	733.1 - 1099.7	397	1766
BC1000-039-CA											0.039	1.00	0.096	2.43	0.050	1.26	214.1 - 321.2	952.5 - 1428.7	485	2158
BC1000-043-CA											0.043	1.10	0.099	2.52	0.057	1.45	186.0 - 279.0	827.3 - 1241.0	578	2570