



QA Technology Company, Inc.

A p p l i c a t i o n s N o t e
Socket Pushout Forces
G10 & Acrylic at Various Set Heights
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Conclusions:

- In G-10, increasing the socket set height increases the socket pushout force. This is due to the abrasive nature of G10, which removes material from the press ring as the socket is pushed in to lower set heights and thus reduces the interference fit.
- In acrylic, pushout force is less dependent on set height, since acrylic is not as abrasive as G10 and therefore does not appreciably remove press ring material as the socket is pushed in to lower set heights.
- Sockets mounted in G10 have greater pushout force than sockets mounted in acrylic. The amount of the difference varies depending on socket type and set height, but the difference is present in all cases.
- At set heights greater than .125” in G10, .100” centers sockets with the standard press ring have higher pushout force than sockets with extended press rings. However, sockets with extended press rings have higher pushout force at set heights below .125”. This effect is also present with .075” centers sockets, but the set height threshold is .225”.
- The pushout force for .050” centers sockets in G10 does not appreciably vary for different set heights. The 050-25 series tested uses triple press rings; the top ring enters the plate as the lower one wears and exits, holding pushout force constant.

Test Procedure:

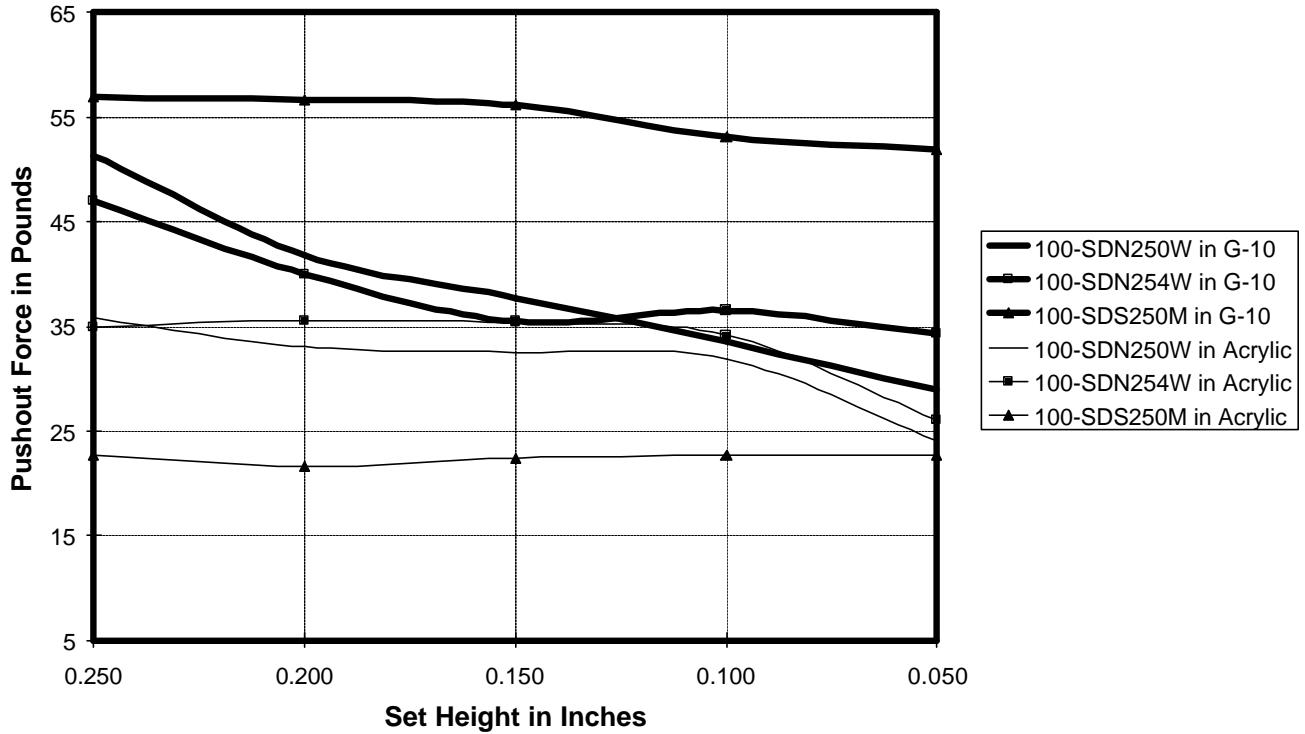
Test plates were made from 5/16” thick G10 and acrylic, and holes on .100” grid were automatically drilled using solid carbide circuit board drills. Finished hole diameters were .067/.069” for .100 inch centers sockets, .053/.055 for .075, and .038/.039 for .050. Ten samples of each of the seven socket types tested were installed to five different set heights (see data) in each of the two plate materials. A screw-driven press was used to ensure that the sockets were installed at consistent speed, as previous tests have shown that varying installation time will affect pushout force. Sockets were pushed out using the same press and a digital force gage to measure maximum pushout force. The sockets tested were: 100-SDN250W, 100-SDN254W, 100-SDS250M, 075-SDN250W, 075-SDN254W, 075-SDS250M and 050-SRB255P.

Data:

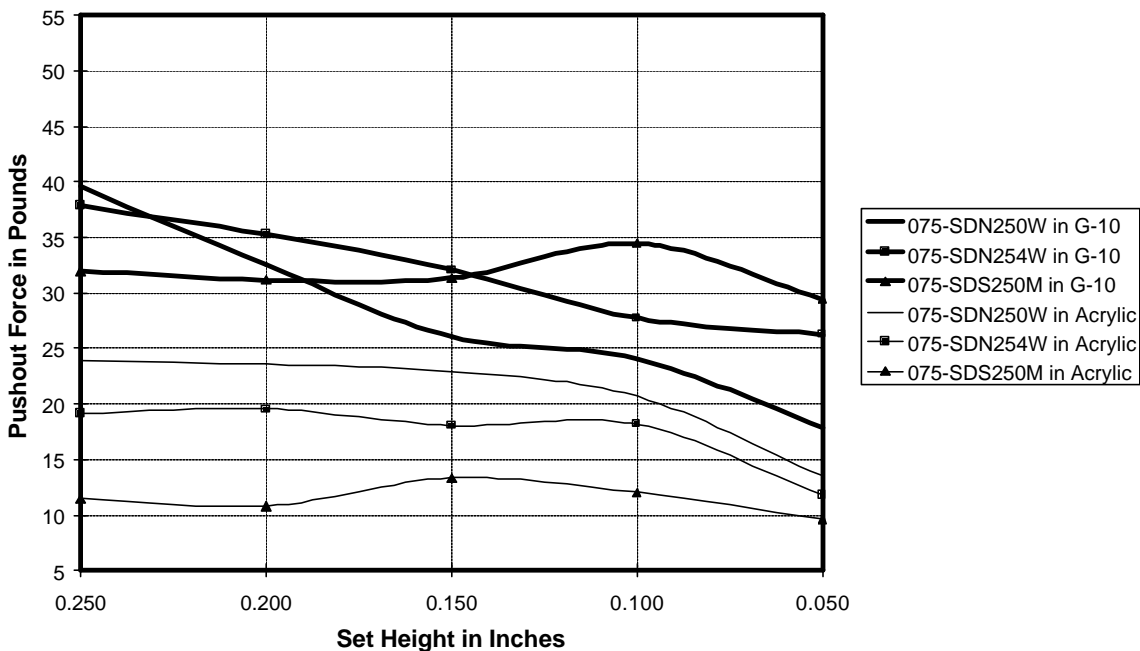
Attached are three graphs showing pushout forces versus set height for each of the three socket center spacings. Five tables showing the numeric force data and related statistics are also included.



100-25 Series Socket Pushout Force 100-SDN250W vs 100-SDN254W vs 100-SDS250M in G10 and Acrylic

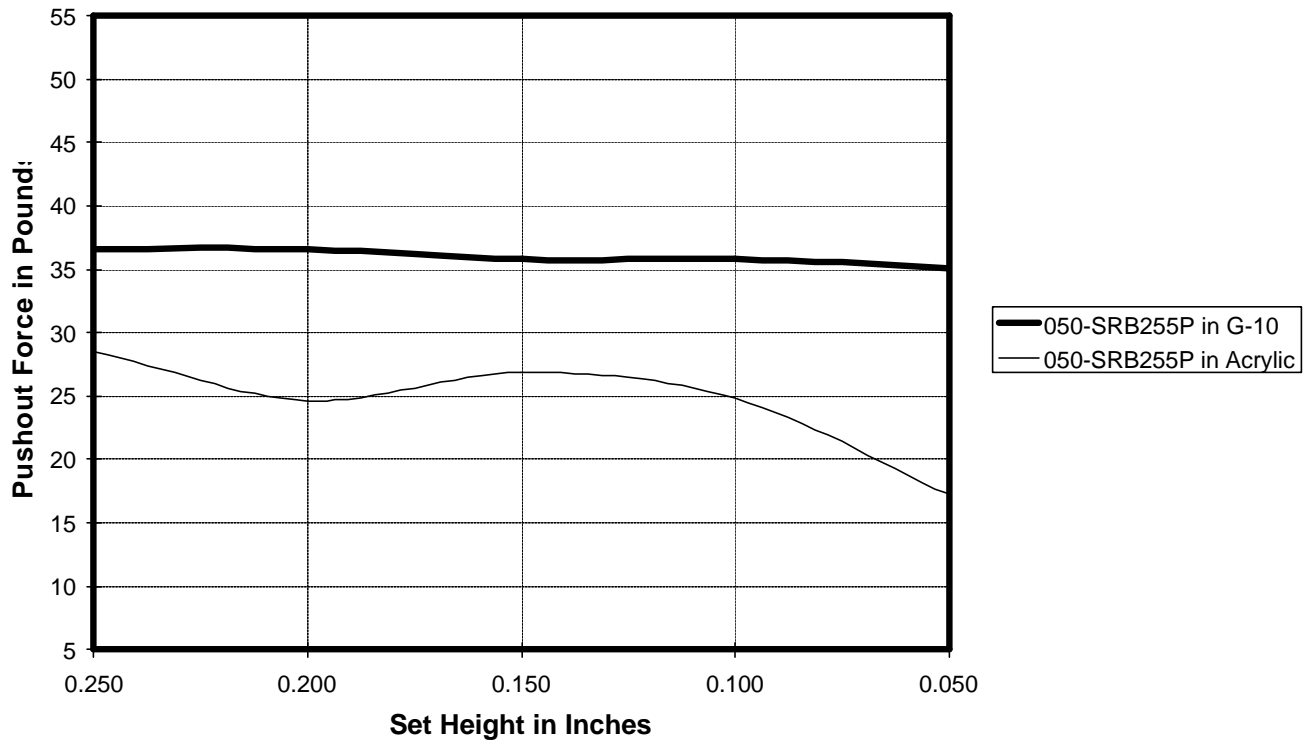


075-25 Series Socket Pushout Force 075-SDN250W vs 075-SDN254W vs 075-SDS250M in G10 and Acrylic





**050-25 Series Socket Pushout Force
050-SRB255P in G10 and Acrylic**





P/N and Lot	100-SDN250W						Lot 5228						100-SDN254W						Lot 5224						100-SDS250M						5272							
Plate Material	G-10												G-10												G-10													
Set Height	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050								
In/Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	In	Out	Out	Out	Out	Out							
1	64.0	51.7	43.2	36.4	30.1	27.8	40.5	50.3	43.7	33.3	39.2	30.3	38.1	46.7	42.6	55.2	51.6	51.9																				
2	65.9	52.6	43.0	37.7	33.3	27.4	38.3	46.9	39.1	37.1	39.0	35.7	41.1	44.9	50.1	55.8	52.9	52.1																				
3	63.7	52.7	41.6	41.1	33.5	31.3	35.3	42.7	35.1	33.6	36.4	30.9	41.8	50.4	56.7	53.9	52.2	50.7																				
4	61.1	50.1	42.0	41.0	34.2	27.3	37.8	43.9	34.3	27.2	36.7	35.7	57.7	49.3	58.7	54.9	53.1	54.5																				
5	55.4	50.7	41.9	36.1	34.2	28.1	38.6	51.1	37.0	39.3	33.5	30.9	37.1	60.1	58.7	56.9	54.5	51.5																				
6	61.6	51.4	42.9	36.3	33.7	27.5	39.5	45.1	49.5	37.0	34.1	32.3	38.2	57.7	58.5	55.1	50.5	51.7																				
7	60.5	52.3	42.1	36.9	31.7	30.5	37.6	49.3	40.0	36.9	36.4	36.8	45.1	73.8	58.9	56.3	51.5	50.9																				
8	65.7	50.5	41.1	37.9	33.8	31.2	39.3	44.4	42.3	37.8	37.1	37.9	39.1	59.6	58.2	56.5	53.8	51.3																				
9	68.7	50.9	39.4	38.1	36.7	26.9	39.1	45.5	40.5	35.9	38.3	37.1	36.1	61.7	60.9	57.2	55.3	52.0																				
10	64.5	50.7	41.0	36.1	34.0	31.3	39.1	50.2	38.9	36.7	34.7	35.3	39.7	64.8	63.3	59.5	55.5	53.1																				
Min	55.4	50.1	39.4	36.1	30.1	26.9	35.3	42.7	34.3	27.2	33.5	30.3	36.1	44.9	42.6	53.9	50.5	50.7																				
Max	68.7	52.7	43.2	41.1	36.7	31.3	40.5	51.1	49.5	39.3	39.2	37.9	57.7	73.8	63.3	59.5	55.5	54.5																				
Avg	63.1	51.4	41.8	37.8	33.5	28.9	38.5	46.9	40.0	35.5	36.5	34.3	41.4	56.9	56.7	56.1	53.1	52.0																				
Std Dev	3.67	0.93	1.14	1.89	1.71	1.89	1.41	3.05	4.43	3.42	1.98	2.89	6.29	9.05	5.98	1.56	1.68	1.12																				

P/N and Lot	100-SDN250W						Lot 5228						100-SDN254W						Lot 5228						100-SDS250M						5272							
Plate Material	Acrylic												Acrylic												Acrylic													
Set Height	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050	0.250	0.250	0.200	0.150	0.100	0.050								
In/Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	In	Out	Out	Out	Out	Out							
1	14.6	36.2	34.9	34.7	29.2	30.3	17.9	42.2	42.7	38.5	37.7	29.8	8.5	27.9	24.4	23.6	19.9	19.1																				
2	14.3	36.9	35.1	33.5	32.9	26.5	19.7	37.6	42.6	35.5	42.0	31.2	8.8	28.7	24.8	27.9	25.2	21.8																				
3	13.8	37.7	35.6	34.5	31.6	25.6	14.9	38.0	35.8	35.3	38.4	26.9	10.5	25.2	22.3	24.9	26.6	22.6																				
4	13.8	34.5	36.3	34.4	31.6	22.5	16.1	32.7	34.1	40.9	29.8	28.1	10.6	22.1	20.3	21.5	21.8	22.4																				
5	13.4	36.8	32.7	29.9	34.1	21.9	15.1	31.1	37.1	36.3	32.1	23.2	9.2	19.1	17.3	20.9	22.5	25.3																				
6	13.6	35.2	33.3	34.5	29.7	22.6	16.1	35.0	32.1	30.5	30.1	22.5	10.3	22.8	21.2	21.2	21.3	22.7																				
7	13.6	37.5	31.7	36.3	31.5	23.8	14.5	39.9	35.9	30.1	33.3	23.4	10.9	17.5	16.8	17.4	17.2	21.5																				
8	12.5	34.5	31.3	24.9	31.6	22.8	12.5	30.1	33.5	34.3	35.8	21.9	12.3	22.3	21.8	22.9	22.8	19.9																				
9	13.3	34.2	30.7	26.9	32.3	22.9	15.0	31.6	33.6	37.9	33.1	25.9	9.4	20.9	23.5	22.1	24.9	24.9																				
10	12.5	34.4	29.0	35.9	34.6	22.3	13.6	31.5	28.5	34.4	29.7	27.7	9.6	21.1	23.9	22.3	24.5	27.0																				
Min	12.5	34.2	29.0	24.9	29.2	21.9	12.5	30.1	28.5	30.1	29.7	21.9	8.5	17.5	16.8	17.4	17.2	19.1																				
Max	14.6	37.7	36.3	36.3	34.6	30.3	19.7	42.2	42.7	40.9	42.0	31.2	12.3	28.7	24.8	27.9	26.6	27.0																				
Avg	13.5	35.8	33.1	32.6	31.9	24.1	15.5	35.0	35.6	35.4	34.2	26.1	10.0	22.8	21.6	22.5	22.7	22.7																				
Std Dev	0.67	1.38	2.40	3.93	1.69	2.64	2.07	4.22	4.41	3.35	4.17	3.22	1.14	3.58	2.81	2.74	2.80	2.43																				



P/N and Lot	075-SDN250W						Lot 4207						075-SDN254W						Lot 5201						075-SDS250M						Lot 5128					
Plate Material	G-10												G-10												G-10											
Set Height	0.250		0.250		0.200		0.150		0.100		0.050		0.250		0.250		0.200		0.150		0.100		0.050		0.250		0.250		0.200		0.150		0.100		0.050	
In/Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	Out	Out	Out	Out	Out	Out			
1	40.9	37.9	29.1	24.8	20.6	14.0	38.4	37.2	34.7	29.7	24.9	21.7	23.3	31.8	31.5	31.1	33.9	30.6																		
2	41.6	35.9	30.4	24.9	22.7	14.4	44.7	35.1	31.6	25.6	22.9	21.3	30.1	35.9	31.3	29.9	33.6	29.4																		
3	43.7	36.2	33.2	28.9	26.3	17.4	43.3	38.7	37.1	31.0	26.0	28.5	26.5	32.4	30.4	29.9	36.9	30.5																		
4	46.6	41.2	33.8	29.8	30.3	16.3	44.7	40.2	36.0	32.5	28.8	26.8	24.9	29.3	30.7	31.8	36.3	26.9																		
5	45.5	41.2	33.9	24.9	25.1	20.8	43.6	41.0	33.6	34.3	32.4	27.5	27.5	33.4	32.9	29.0	38.8	30.5																		
6	47.0	40.6	32.6	23.5	21.5	18.6	40.7	36.7	35.3	30.7	27.6	26.6	25.9	30.9	29.3	30.3	32.5	30.5																		
7	44.7	41.6	32.0	24.1	25.6	18.3	41.3	36.0	37.3	32.1	30.0	27.9	19.7	28.4	33.7	32.6	32.5	29.2																		
8	47.5	40.4	30.8	23.7	21.1	18.8	37.6	37.2	34.5	36.3	27.8	26.9	26.4	31.6	30.4	31.3	32.9	28.5																		
9	41.4	38.4	34.3	29.0	23.2	18.4	39.6	36.5	35.5	31.1	28.4	29.7	28.4	33.9	30.2	33.3	33.3	29.7																		
10	45.7	42.1	35.3	26.8	24.3	21.9	33.5	39.9	37.2	37.5	28.7	25.8	27.5	32.5	31.2	34.1	34.1	28.4																		
Min	40.9	35.9	29.1	23.5	20.6	14.0	33.5	35.1	31.6	25.6	22.9	21.3	19.7	28.4	29.3	29.0	32.5	26.9																		
Max	47.5	42.1	35.3	29.8	30.3	21.9	44.7	41.0	37.3	37.5	32.4	29.7	30.1	35.9	33.7	34.1	38.8	30.6																		
Avg	44.5	39.6	32.5	26.0	24.1	17.9	40.7	37.9	35.3	32.1	27.8	26.3	26.0	32.0	31.2	31.3	34.5	29.4																		
Std Dev	2.44	2.27	1.95	2.39	2.93	2.50	3.58	1.98	1.79	3.40	2.66	2.74	2.90	2.18	1.31	1.63	2.13	1.21																		

P/N and Lot	075-SDN250W						Lot 4207						075-SDN254W						Lot 5201						075-SDS250M						Lot 5128					
Plate Material	Acrylic												Acrylic												Acrylic											
Set Height	0.250		0.250		0.200		0.150		0.100		0.050		0.250		0.250		0.200		0.150		0.100		0.050		0.250		0.250		0.200		0.150		0.100		0.050	
In/Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	Out	Out	Out	Out	Out				
1	21.2	26.7	23.9	24.8	25.7	19.5	18.5	23.9	24.8	22.5	22.1	14.2	3.5	10.1	15.8	20.0	13.6	10.7																		
2	19.7	23.7	21.9	26.3	23.2	15.0	13.5	19.9	20.1	19.1	19.5	12.2	3.6	10.1	14.3	12.3	12.3	9.3																		
3	17.6	25.2	23.5	24.1	19.3	14.5	12.7	21.0	18.7	16.0	16.9	11.7	4.7	17.2	10.9	16.5	11.9	10.7																		
4	14.0	24.6	24.4	23.5	17.9	13.7	14.1	20.2	18.2	18.1	20.1	11.8	4.5	13.6	8.1	15.3	14.1	11.6																		
5	12.6	23.1	25.1	18.2	23.5	13.0	13.2	17.3	20.2	15.5	18.2	11.3	6.1	7.9	11.2	8.7	11.2	8.6																		
6	13.1	23.8	24.5	21.3	21.5	12.5	10.3	18.5	19.5	16.5	15.7	11.7	4.3	9.3	9.1	11.3	9.4	9.1																		
7	10.1	23.2	24.5	22.1	19.4	12.8	10.3	18.3	19.3	13.9	16.3	11.9	5.1	12.5	7.8	12.0	9.9	8.2																		
8	9.9	24.5	22.9	20.7	19.3	11.8	11.9	19.1	19.5	21.1	16.3	12.2	5.5	11.5	13.5	10.7	11.0	8.3																		
9	11.0	21.2	24.5	25.9	20.3	12.1	12.4	19.2	19.0	17.7	16.9	9.6	6.6	10.3	10.3	11.2	12.5	9.7																		
10	9.4	23.7	20.3	22.5	16.9	10.6	10.8	13.9	16.3	20.3	19.9	11.4	7.8	12.3	7.2	15.5	14.6	10.3																		
Min	9.4	21.2	20.3	18.2	16.9	10.6	10.3	13.9	16.3	13.9	15.7	9.6	3.5	7.9	7.2	8.7	9.4	8.2																		
Max	21.2	26.7	25.1	26.3	25.7	19.5	18.5	23.9	24.8	22.5	22.1	14.2	7.8	17.2	15.8	20.0	14.6	11.6																		
Avg	13.9	24.0	23.6	22.9	20.7	13.6	12.8	19.1	19.6	18.1	18.2	11.8	5.2	11.5	10.8	13.4	12.1	9.7																		
Std Dev	4.24	1.45	1.48	2.50	2.74	2.46	2.41	2.58	2.15	2.70	2.11	1.12	1.36	2.62	2.93	3.38	1.73	1.15																		

P/N and Lot	050-SRB255P						Lot 5226						050-SRB255P						Lot 5226													
Plate Material	G-10												Acrylic																			
Set Height	0.250		0.250		0.200		0.150		0.100		0.050		0.250		0.250		0.200		0.150		0.100		0.050									
In/Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	In	Out	Out	Out	Out	Out	In	Out	Out	Out	Out	Out	Out	Out		
1	28.2	38.5	31.5	32.8	32.9	25.7	12.4	32.1	28.5	24.2	15.5	15.1																				
2	28.8	39.7	39.3	34.9	34.4	28.8	11.9	29.9	18.3	22.9	23.7	13.9																				
3	28.7	32.3	37.5	38.8	34.3	36.3	8.5	25.5	24.6	28.9	27.0	16.1																				
4	32.4	36.8	36.8	36.5	30.1	37.8	10.3	26.3	28.3	27.1	27.7	14.5																				
5	29.7	39.5	39.1	36.3	30.6	37.7	9.5	28.6	30.3	22.0	23.1	16.7																				
6	29.3	37.8	27.7	43.9	35.5	38.1	11.8	32.6	22.0	23.5	23.0	21.3																				
7	32.1	35.6	34.9	34.8	38.9	36.7	9.2	26.6	25.9	25.6	25.5	18.0																				
8	37.5	39.7	44.6	31.2	39.7	38.3	9.0	30.2	24.9	30.7	27.5	18.7																				
9	35.0	32.0	35.1	30.9	44.5	31.9	8.2	24.9	20.3	32.3	28.6	18.1																				
050-SRB255P i	30.9	34.3	39.3	37.7	37.3	39.8	9.5	28.7	23.5	31.4	26.8	19.8																				
050-SRB255P i	28.2	32.0	27.7	30.9	30.1	25.7	8.2	24.9	18.3	22.0	15.5	13.9																				
Max	37.5	39.7	44.6	43.9	44.5	39.8	12.4	32.6	30.3	32.3	28.6	21.3																				
Avg	31.3	36.6	36.6	35.8	35.8	35.1	10.0	28.5	24.7	26.9	24.8	17.2																				
Std Dev	3.04	2.96	4.67	3.87	4.41	4.69	1.50	2.69	3.79	3.78	3.85	2.39																				