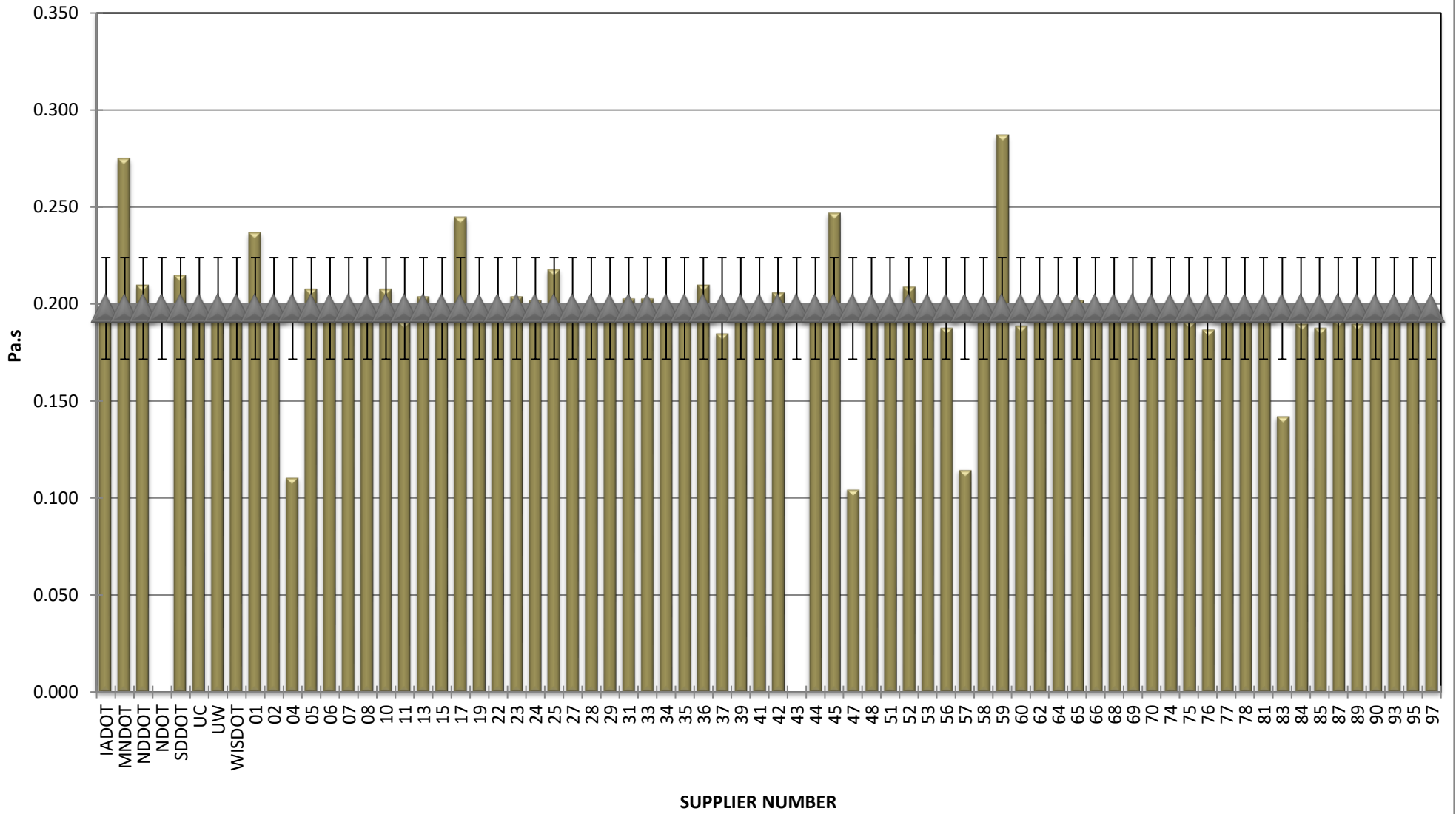


**COMBINED STATE BINDER GROUP ROUND ROBIN SUMMARY A 2019-2
PG 52S-34**

Supplier Number	Rotational Viscosity (Pa.s) @135°C	DSR Original (kPa)	DSR RTFO (kPa)	DSR PAV (kPa)	Mass Loss (%) @163°C	BBR S-value (MPa)	BBR m-value	Jnr @ 100 Pa	% Recov. @ 100 Pa	Jnr @ 3200 Pa	% Recov. @ 3200 Pa
IADOT	0.198	1.39		4,150	0.661	295	0.324	2.470	4.79	2.660	1.49
MNDOT	0.275	1.35		4,065	0.867	264	0.333	2.181	4.69	2.411	0.98
NDDOT	0.210	1.43		4,444	0.769	292	0.339	2.380	5.00	2.624	1.40
NDOT	0.210	1.42		3,656	0.654	292	0.332	2.350	3.70	2.630	0.80
SDDOT	0.215	1.38		5,070	0.693	260	0.324	2.649	3.33	3.009	-0.40
UC	0.197	1.36		3,758	0.648	280	0.329	2.464	5.50	2.798	0.90
UW	0.194	1.47		4,341	0.835	269	0.316	2.090	4.00	2.370	0.24
WISDOT	0.195	1.39		4,900	0.636			2.450	3.72	2.690	0.58
01	0.237	1.34		5,100	0.714	288	0.316	2.330	5.08	2.560	1.40
02	0.193	1.41		4,410	0.771	294	0.322	2.100	4.36	2.320	0.70
04	0.111	1.42		3,886	0.438	296	0.318	2.475	4.80	2.887	0.60
05	0.208	1.36		3,820	0.789	251	0.329	2.100	5.23	2.310	1.70
06	0.200	1.34		4,220	0.823	263	0.334	2.400	3.46	2.630	0.39
07	0.196	1.37		3,594	0.779	269	0.337	2.280	3.65	2.510	0.70
08	0.197	1.39		3,700	0.790	258	0.327	2.290	4.94	2.510	1.56
10	0.208	1.35		3,557	0.730	273	0.330	2.130	4.59	2.409	1.02
11	0.191	1.35		4,303	0.743	299	0.322	2.400	3.57	2.600	1.46
13	0.204	1.34		4,500	0.744	295	0.331	2.140	4.20	2.340	0.95
15	0.200	1.32		4,710	0.813	268	0.322	2.332	3.47	2.541	0.72
17	0.245	1.40		5,210	0.740	298	0.312	2.170	5.11	2.380	1.62
19	0.197	1.41		4,429	0.668	289	0.317	2.321	5.20	2.576	1.60
22	0.200	1.43		3,524	0.839	273	0.330	2.161	4.53	2.445	0.96
23	0.204	1.43		3,802	0.635	268	0.340	2.410	4.50	2.630	1.41
24	0.202	1.33		4,420	0.724	284	0.332	2.210	4.68	2.450	0.92
25	0.218	1.40		3,820	0.730	294	0.325	1.600	8.38	1.890	2.26
27	0.193	1.36		3,430	0.817	264	0.353	2.088	4.56	2.312	1.05
28	0.195	1.40		3,952	0.559	272	0.334	2.560	3.59	2.790	1.23
29	0.198	1.41		3,818	0.776	289	0.333	2.300	5.30	2.550	1.56
31	0.203	1.37		4,250	0.790	250	0.332	2.140	5.57	2.380	1.65
33	0.203	1.42		4,080	0.629	266	0.333	2.286	3.81	2.500	0.72
34	0.195	1.31		4,428	0.687	301	0.325	2.430	4.53	2.670	1.38
35	0.200	1.34		3,800	0.689	296	0.338				
36	0.210	1.37		3,686	0.718	269	0.330	2.094	4.53	2.374	1.03
37	0.185	1.38		4,590	0.603	275	0.327	2.600	3.90	2.800	1.20
39	0.200	1.34		3,862	0.796	265	0.323	2.365	3.71	2.585	0.65
41	0.198	1.34		4,160	0.788	257	0.330	2.250	4.89	2.480	1.53
42	0.206	1.35		4,100	0.710	281	0.326	1.911	5.50	2.128	1.35
43		1.42		3,656	0.654	292	0.332	2.350	3.70	2.630	0.80
44	0.199	1.39		3,418	0.721	266	0.333	2.128	4.38	2.412	0.56
45	0.247	1.38		4,800	0.691	306	0.309	2.470	4.26	2.710	1.25
47	0.105	1.41		4,003	0.591	303	0.315	2.411	4.50	2.759	0.80
48	0.195	1.33		4,260	0.667	303	0.326	2.480	3.90	2.720	1.24
51	0.197	1.40		3,650	0.693	299	0.311	2.328	6.10	2.574	1.50
52	0.209	1.39		3,993	0.853	274	0.333	2.133	4.37	2.415	0.93
53	0.198	1.34		3,680	0.743	286	0.375	2.558	3.09	2.890	-0.27
56	0.188	1.34		4,040	0.686	300	0.326	2.300	3.47	2.520	1.44
57	0.115	1.41		4,065	0.417	289	0.324	2.603	3.80	2.959	0.60
58	0.193	1.38		4,373	0.799	297	0.327	2.109	4.08	2.304	1.03
59	0.287	1.85		3,897	0.514	237	0.343	13.500	1.69	2.150	2.09
60	0.189	1.41		4,920	0.816	284	0.322	2.157	3.87	2.352	0.73
62	0.200	1.42		4,354	0.870	276	0.321	2.170	5.16	2.420	0.64
64	0.198	1.33		3,304	0.746	278	0.323	2.606	3.00	2.941	-0.32
65	0.202	1.34		3,400	0.790	251	0.327	2.090	5.29	2.300	1.76
66	0.195	1.37		4,006	0.549	268	0.337	2.450	4.47	2.700	1.33
68	0.195	1.30		3,990	0.773	277	0.333	2.330	6.15	2.580	1.66
69	0.197	1.35		3,627	0.650	277	0.336	2.542	4.30	2.771	0.70
70	0.200	1.40		4,120	0.641	289	0.326	2.224	6.23	2.499	1.55
74	0.200	1.38		4,122	0.702	292	0.338	2.330	4.18	2.565	0.67
75	0.191	1.35		4,574	0.687	291	0.326	2.280	5.15	2.560	0.45
76	0.187	1.37		4,146	0.624	279	0.340	2.421	3.49	2.656	0.34
77	0.200	1.38		6,300	0.804	327	0.306	2.088	3.13	2.256	1.02
78	0.193	1.38		4,235	0.779	289	0.333	2.211	4.20	2.422	0.73
81	0.193	1.36		4,170	0.661	281	0.331	2.272	4.48	2.527	0.73
83	0.143	1.39		4,030	0.736	295	0.323	2.350	5.76	2.650	1.58
84	0.190	1.42		4,488	0.750	272	0.327	2.215	4.81	2.457	0.77
85	0.188	1.35		4,362	0.626	281	0.336	2.502	3.44	2.744	0.25
87	0.192	1.37		4,560	0.748	292	0.328	2.290	4.22	2.530	0.90
89	0.190	1.31		4,350	0.704	276	0.328	2.498	2.87	2.701	0.52
90	0.195	1.40		3,947	0.573	266	0.330	2.630	4.79	2.930	1.23
93	0.200	1.43		3,826	0.868	276	0.340	2.248	5.06	2.477	1.57
95	0.195	1.37		3,528	0.704	254	0.340	2.370	3.85	2.610	0.80
97	0.197	1.42		4,252	0.690	301	0.316	2.291	5.10	2.532	1.60
98	0.197	1.41		4,354	0.689	300	0.317	2.213	6.20	2.454	1.60
99	0.195	1.39		4,158	0.557	264	0.331	2.610	3.44	2.840	1.23
Average	0.198	1.38		4,142	0.710	281	0.329	2.461	4.44	2.552	1.03
Std. Dev.	0.026	0.07		490	0.094	16	0.010	1.323	0.98	0.205	0.52

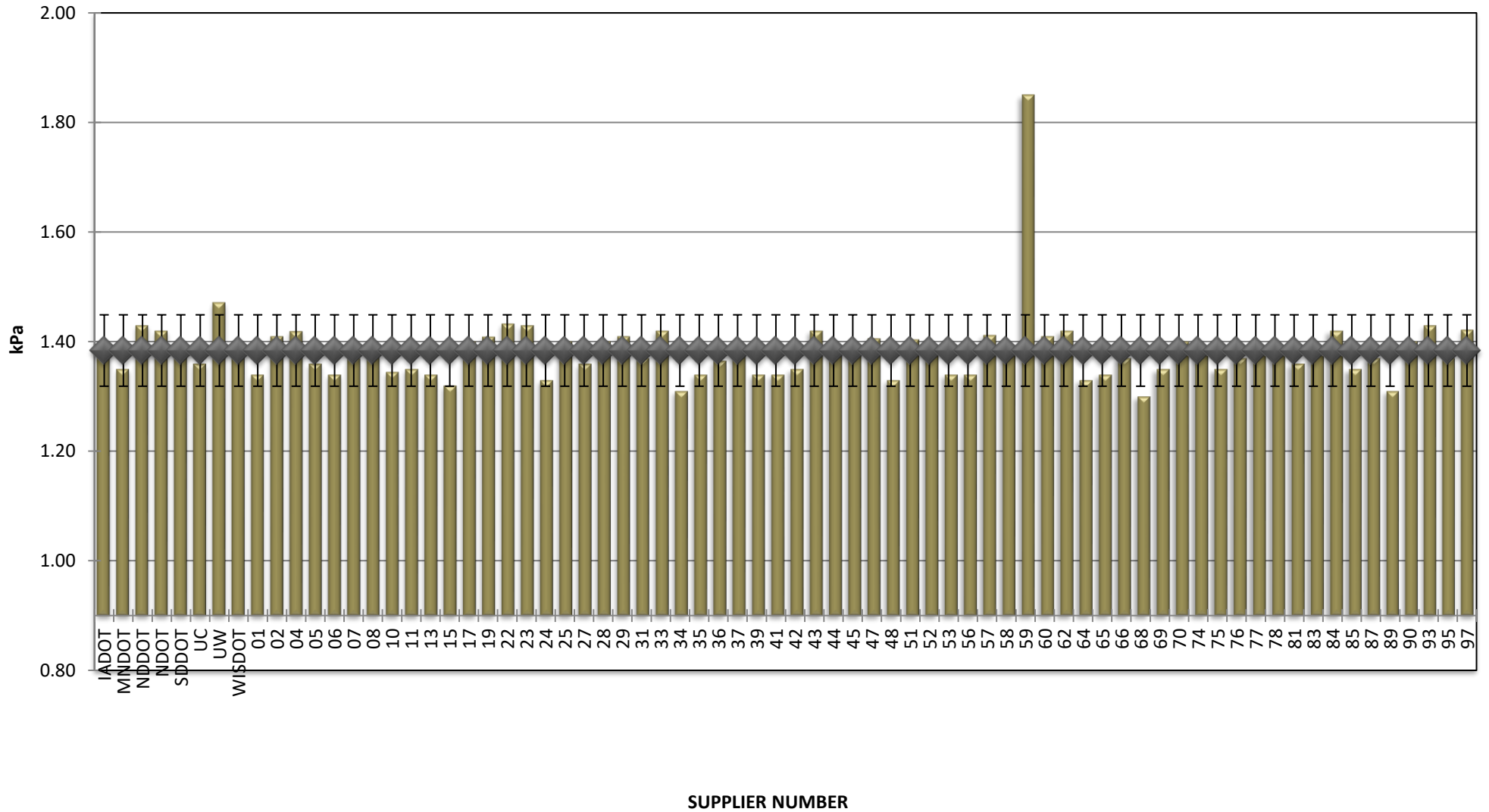
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-2
PG 52S-34**

ROTATIONAL VISCOSITY



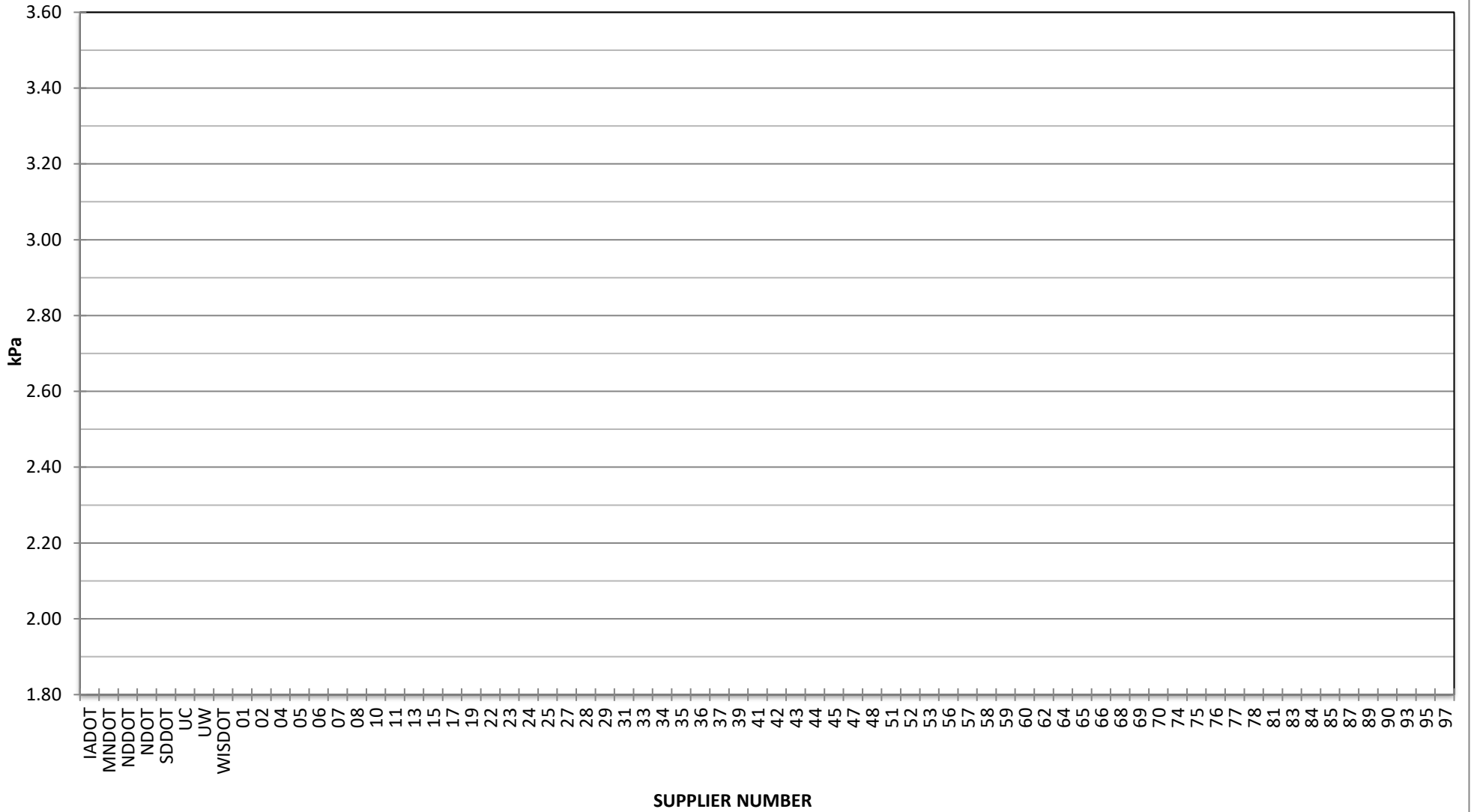
**COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - ORIGINAL



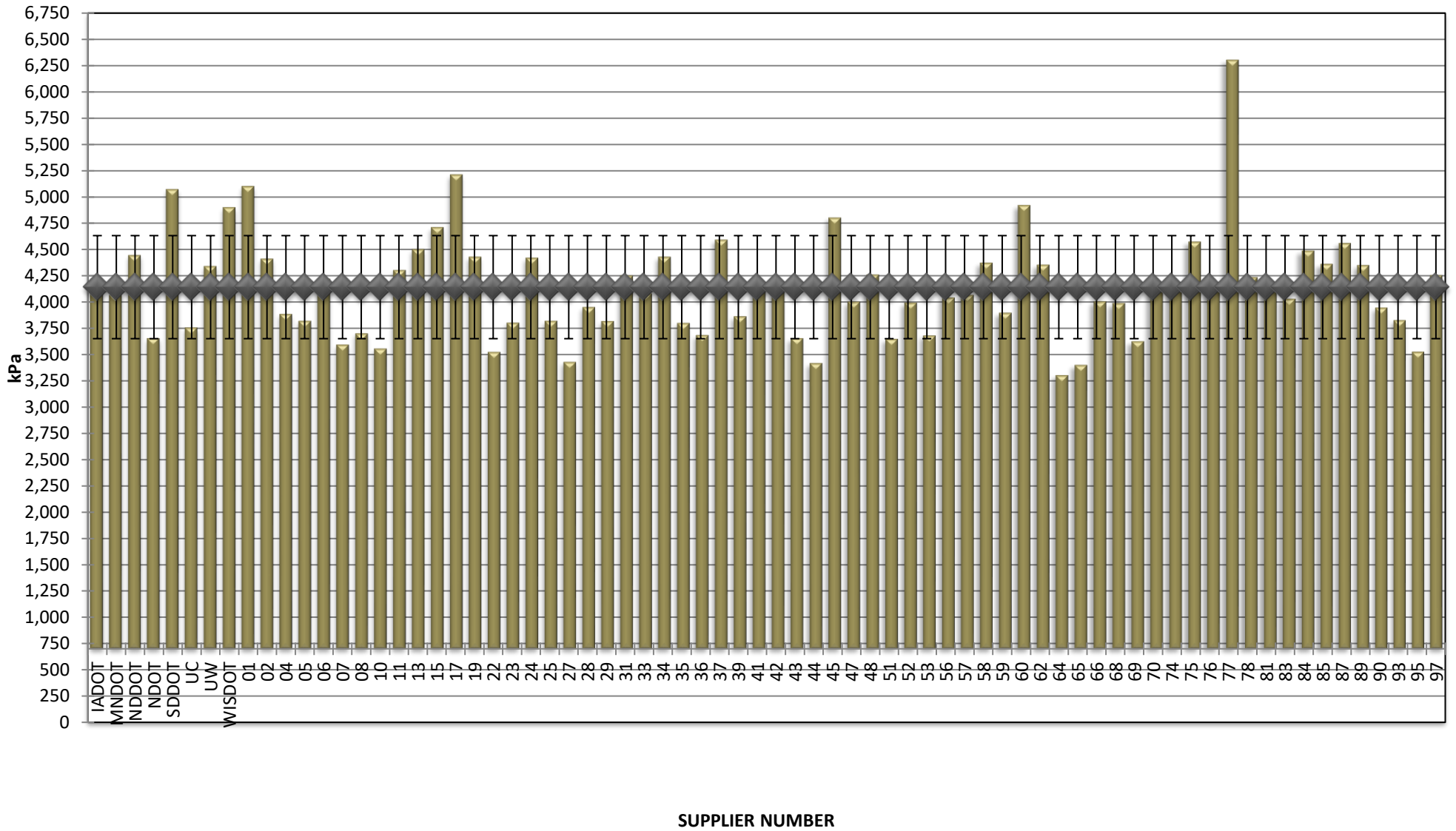
COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-2
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DSR - RTFO



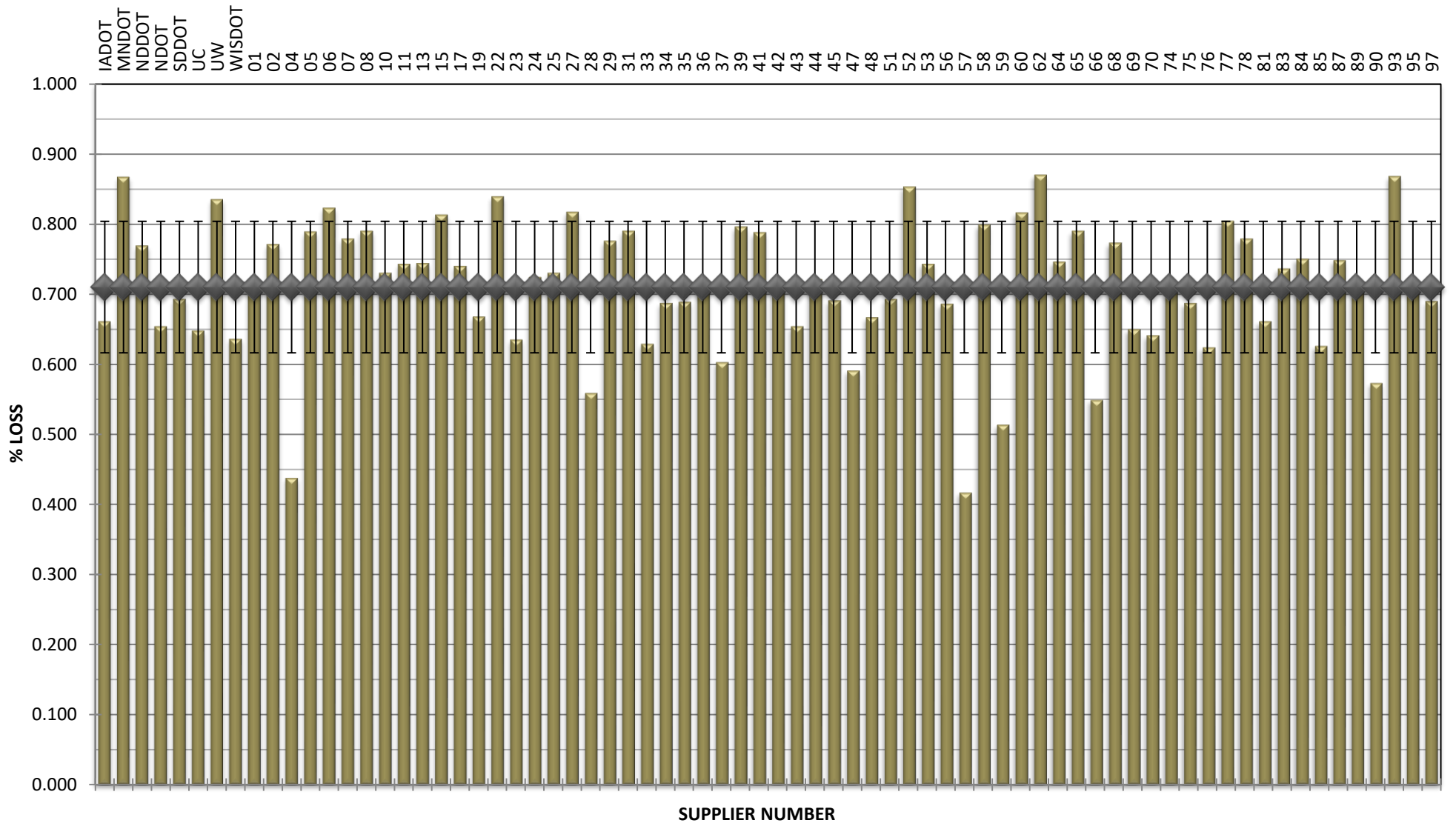
**COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - PAV



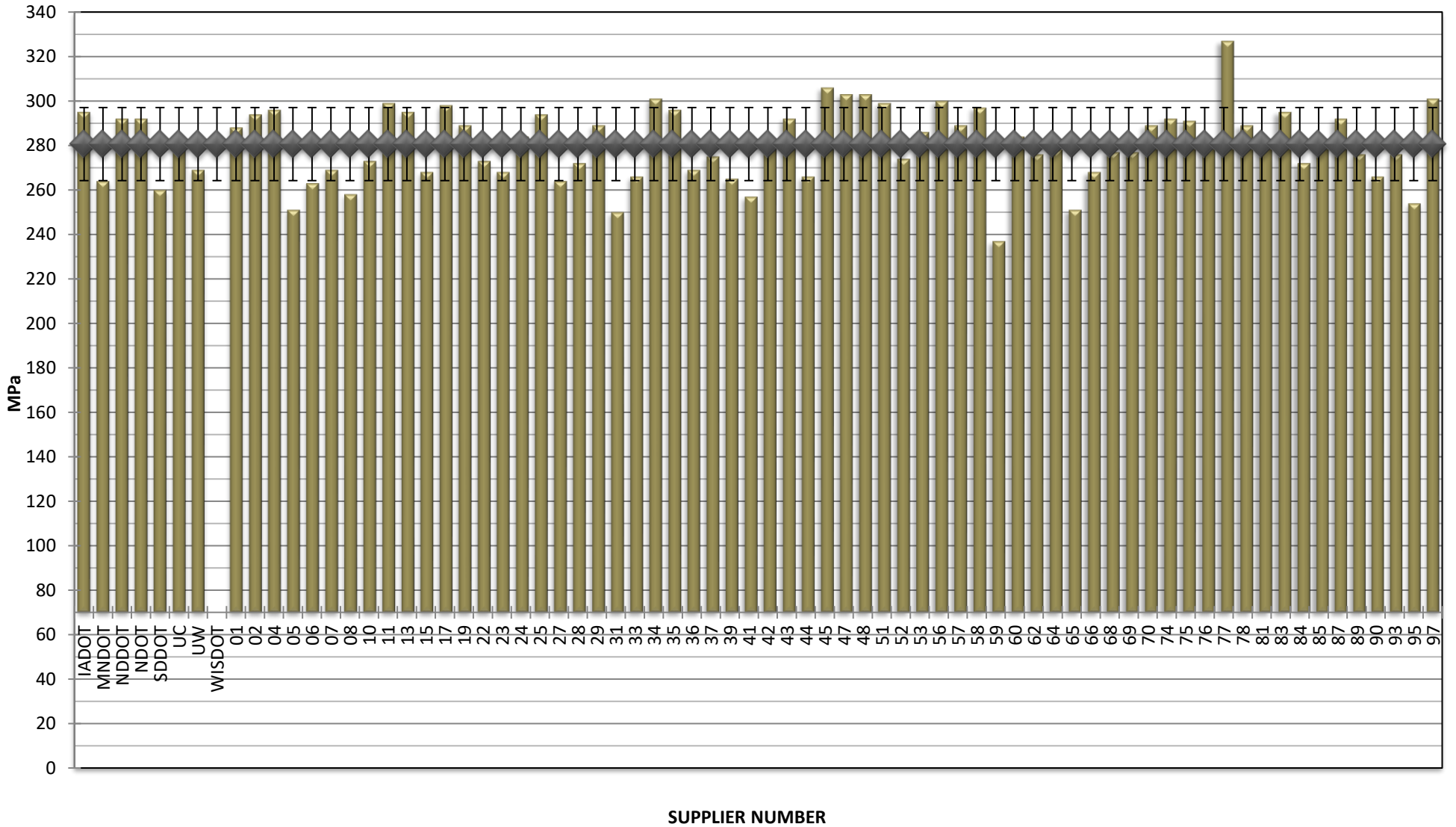
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-2
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RTFO MASS LOSS



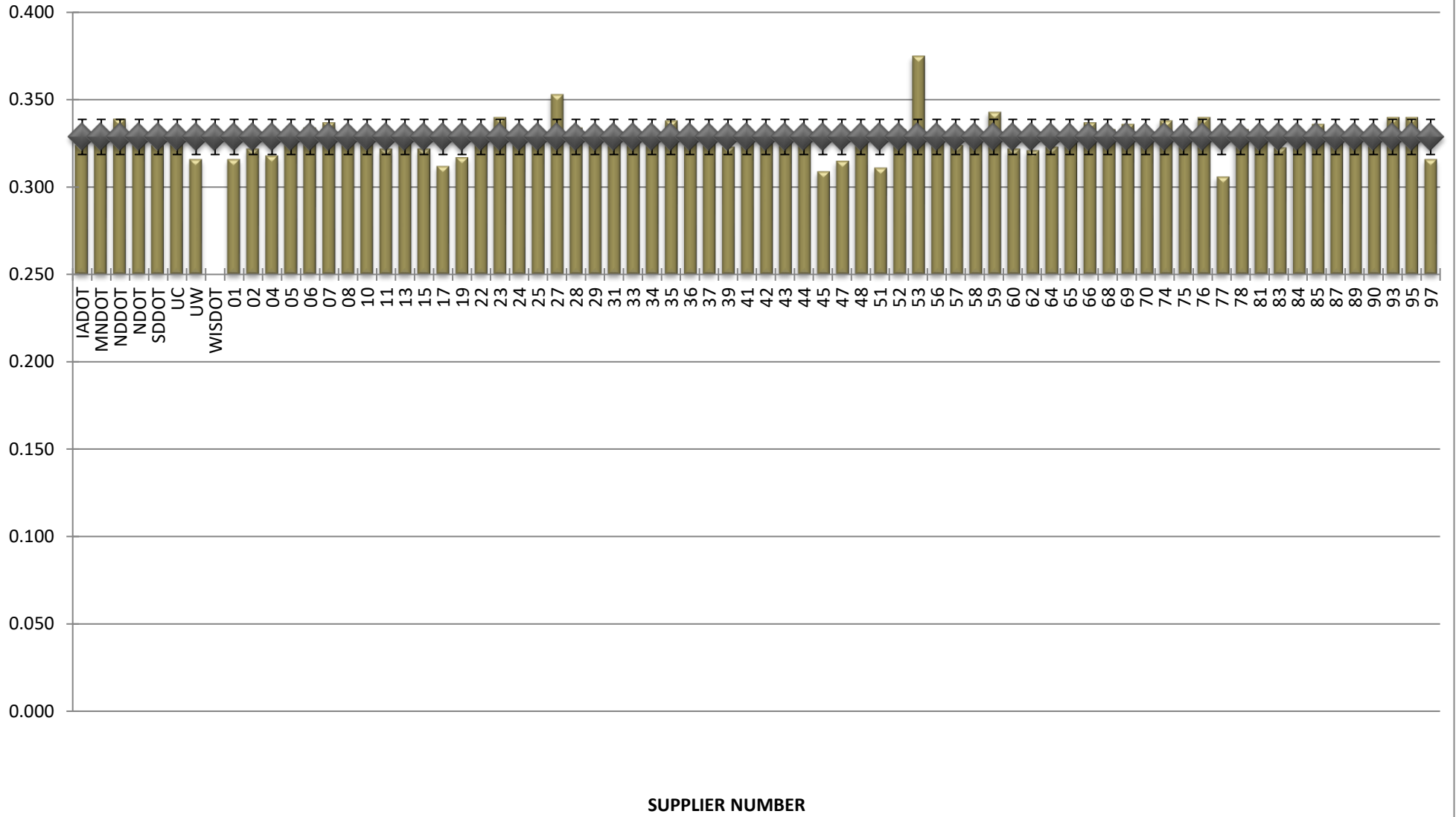
**COMBINED STATE BINDER GROUP ROUND ROBIN
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BBR STIFFNESS



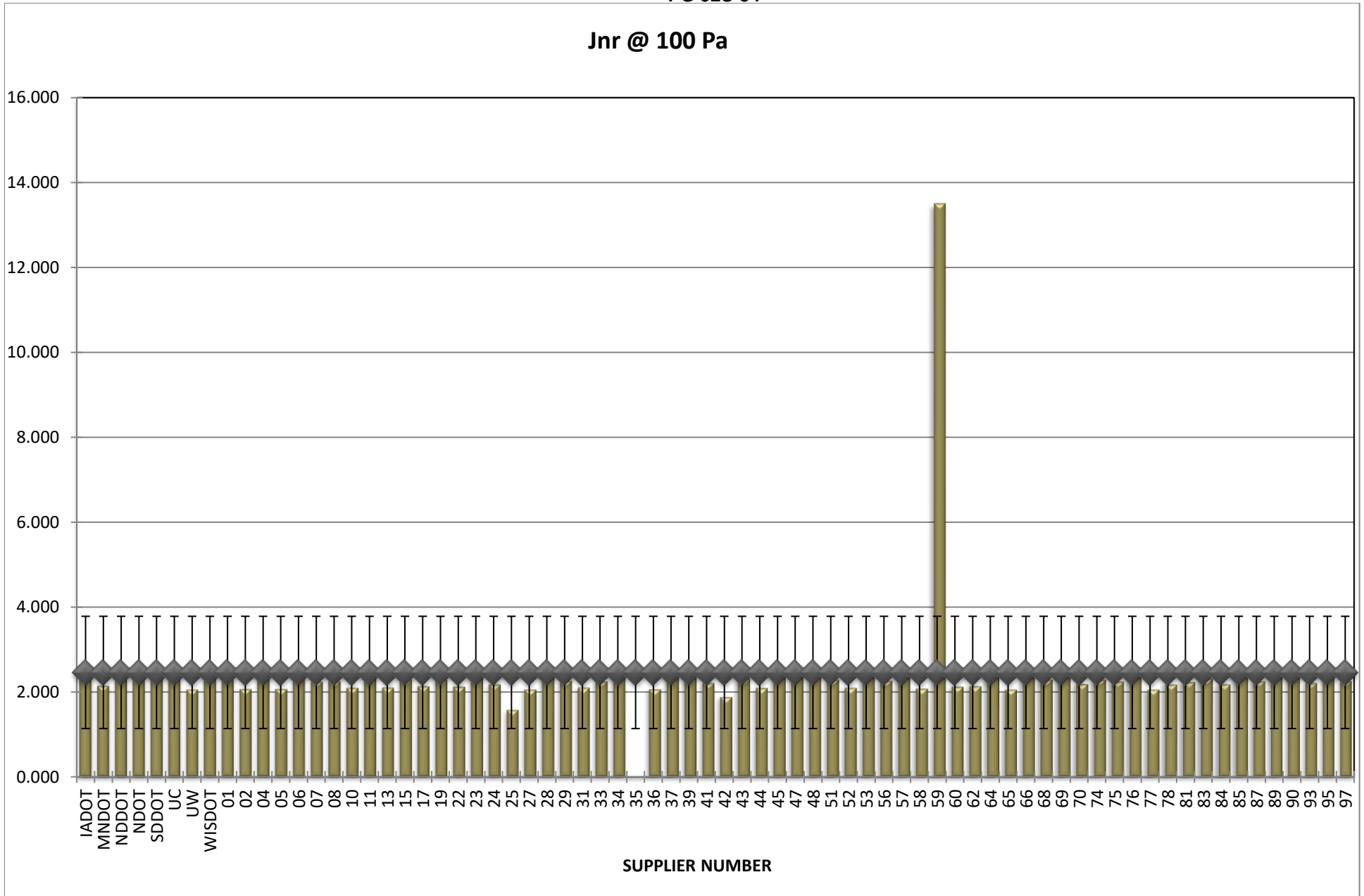
**COMBINED STATE BINDER GROUP ROUND ROBIN
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BBR m-VALUE



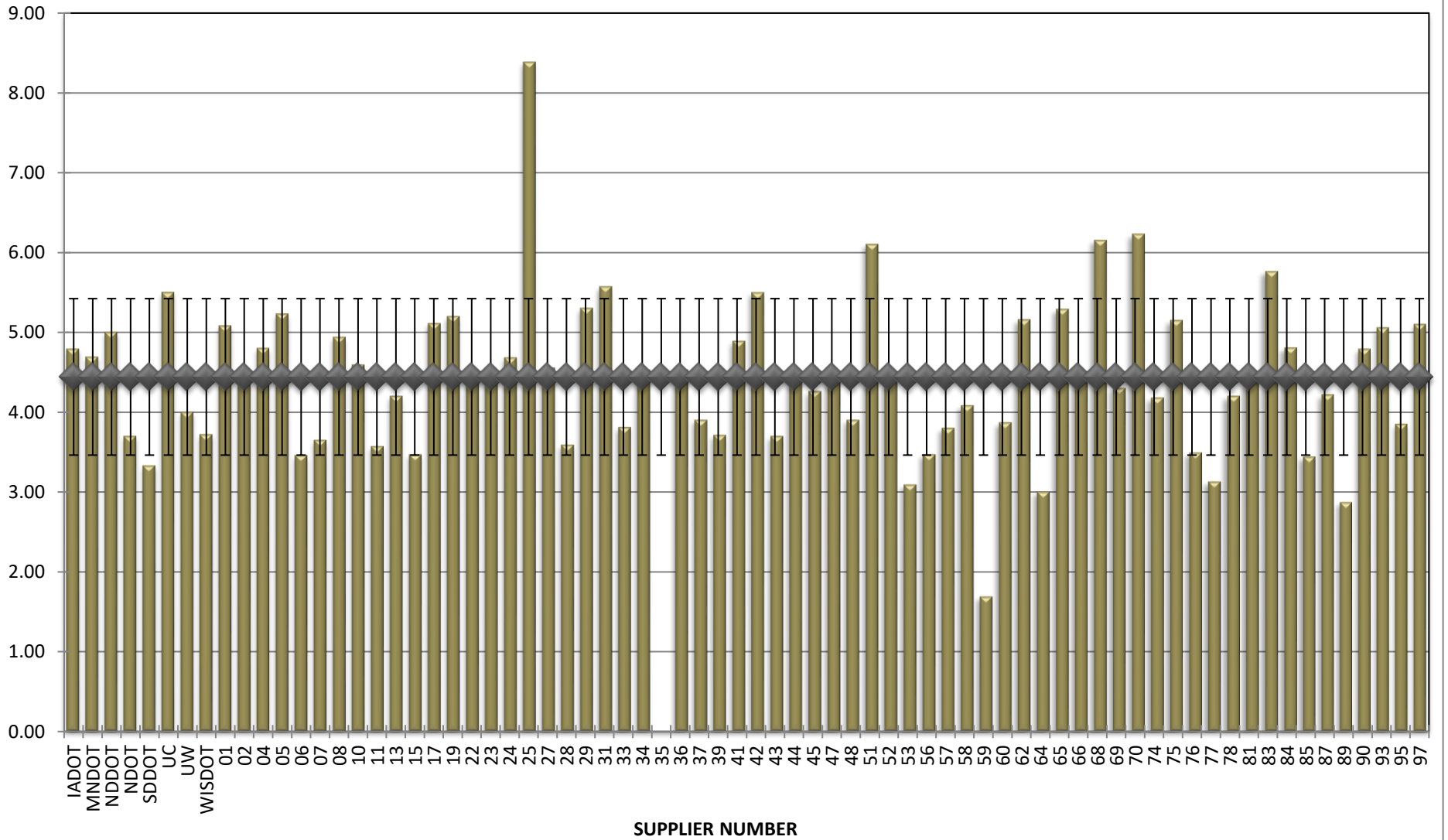
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-2
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Jnr @ 100 Pa



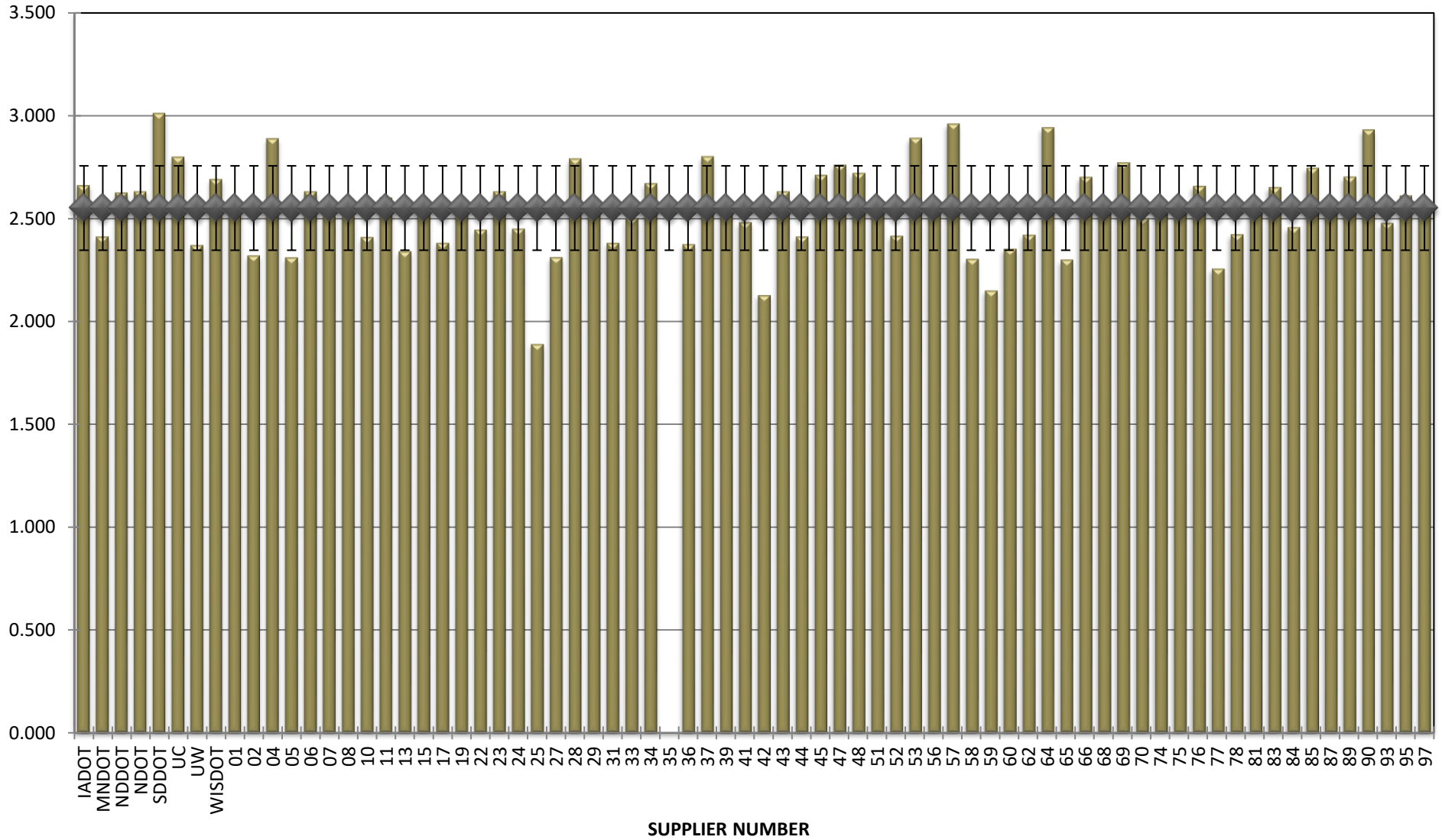
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-2
PG 52S-34**

% Recovery @ 100 Pa



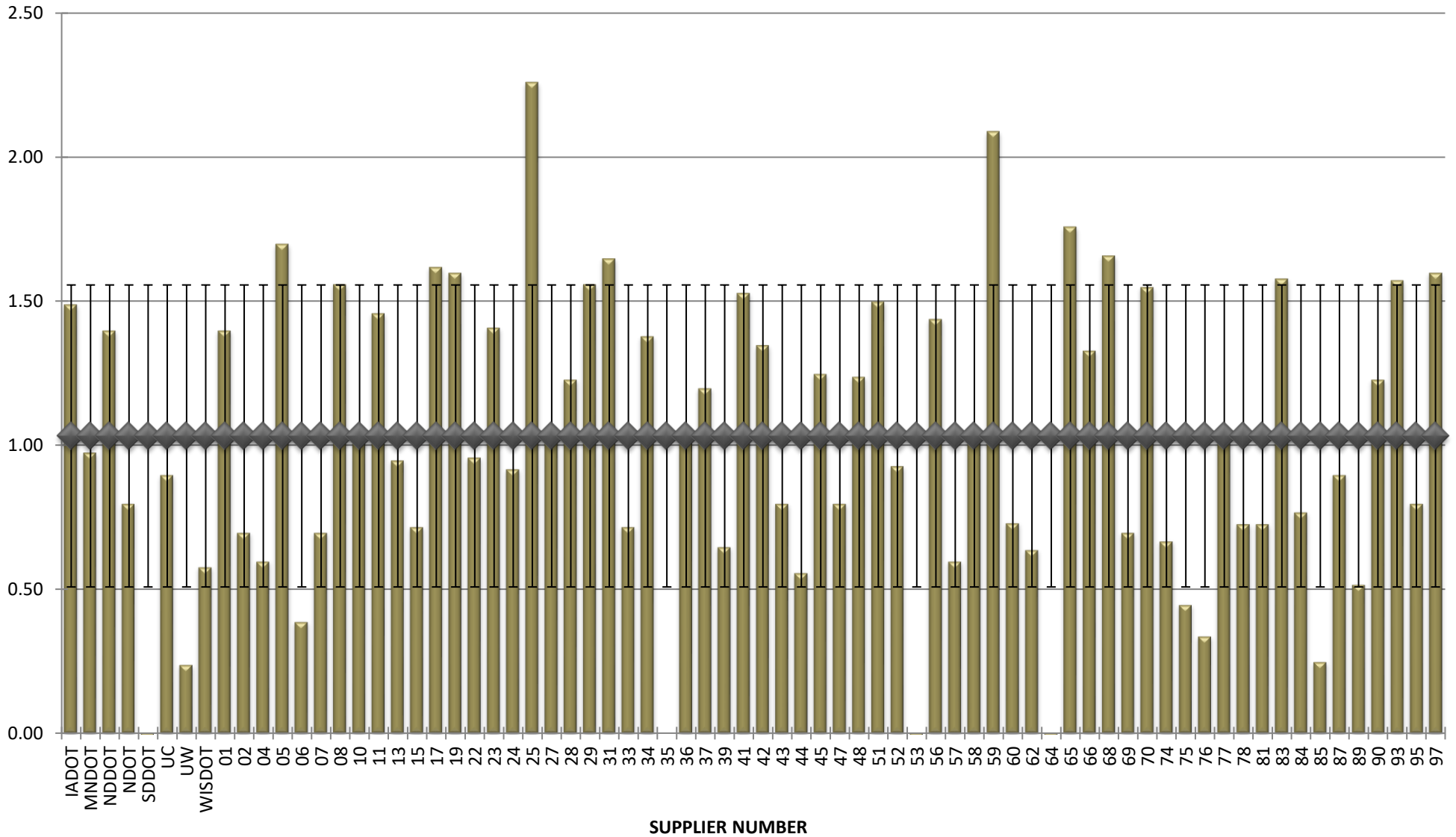
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-2
PG 52S-34**

Jnr @ 3200 Pa



**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-2
PG 52S-34**

% Recovery @ 3200 Pa



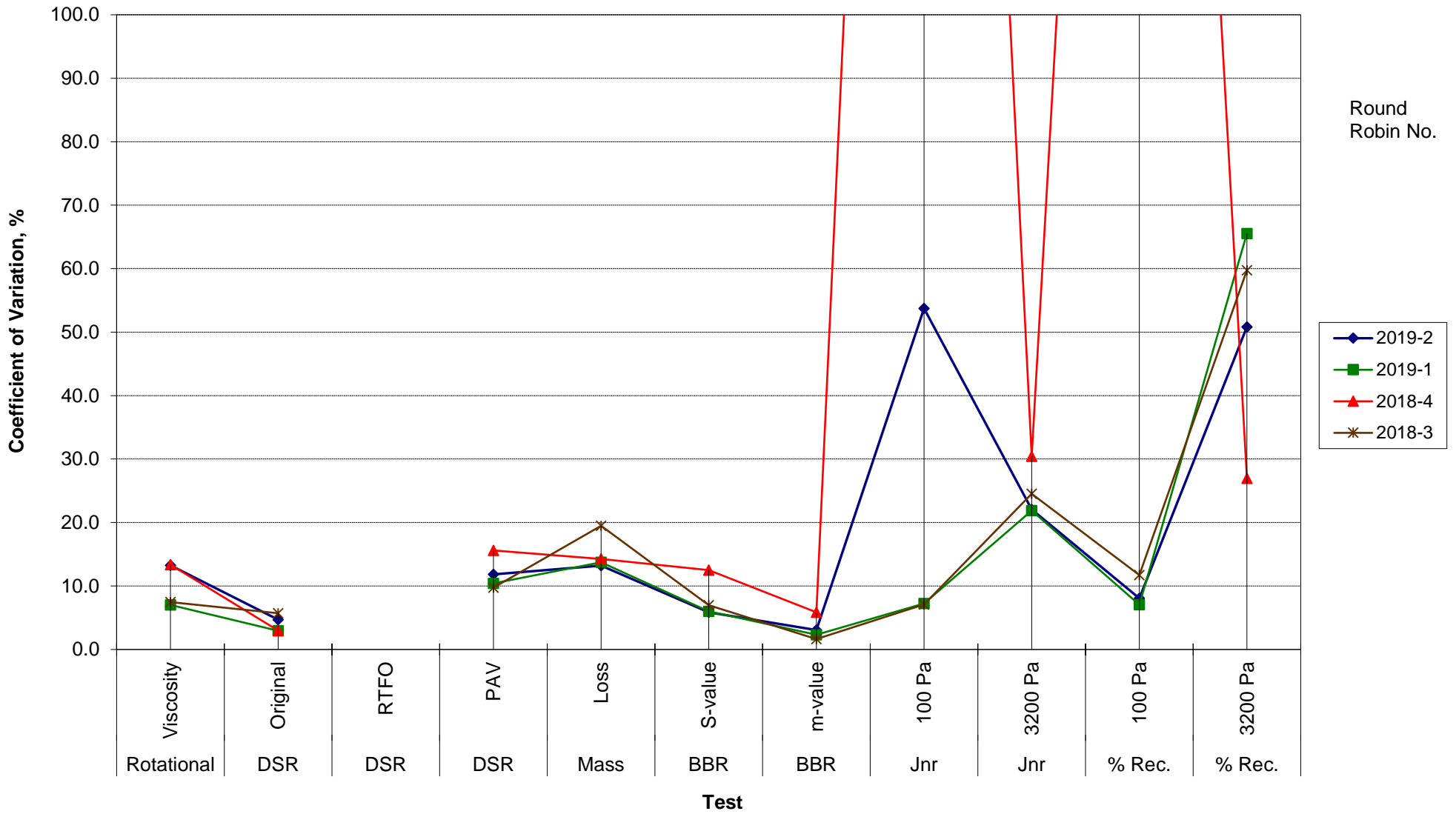
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

COEFFICIENT OF VARIATION

R R No.	Number of Participants	Coefficient of Variation, %											
		Rotational Viscosity	DSR Original	DSR RTFO	DSR PAV	Mass Loss	BBR S-value	BBR m-value	Jnr 100 Pa	Jnr 3200 Pa	% Rec. 100 Pa	% Rec. 3200 Pa	DTT Strain
2019-2	74	13.258	4.708		11.840	13.213	5.855	3.057	53.743	22.057	8.044	50.807	20.079
2019-1	75	7.021	2.932		10.403	13.730	5.989	2.318	7.221	21.894	7.064	65.537	37.342
2018-4	64	13.380	2.979		15.593	14.268	12.499	5.858	372.697	30.415	328.556	26.972	54.582
2018-3	74	7.461	5.724		9.759	19.499	6.972	1.638	7.072	24.530	11.724	59.744	24.227

**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A
PG**

COEFFICIENT OF VARIATION



**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A
PG**

STATISTICS WITH OUTLIERS REMOVED:

	Rotational Viscosity (Pa.s) @135°C	DSR Original (kPa)	DSR RTFO (kPa)	DSR PAV (kPa)	Mass Loss (%) @163°C	BBR S-value (MPa)	BBR m-value	Jnr @ 100Pa	% RECOV. @ 100Pa	Jnr @ 3200Pa	% RECOV. @ 3200Pa
Average	0.200	1.38		4,112	0.710	281	0.328	2.308	4.39	2.561	1.03
Std. Dev.	0.0164	0.0355		427.19	0.0870	16.38	0.0085	0.3285	0.8447	0.1903	0.5367
Coef. of Var.	8.165	2.580		10.388	12.249	5.837	2.585	14.232	19.250	7.432	52.007

**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

COEFFICIENT OF VARIATION

R R No.	Number of Participants	Coefficient of Variation, %											
		Rotational Viscosity	DSR Original	DSR RTFO	DSR PAV	Mass Loss	BBR S-value	BBR m-value	Jnr 100 Pa	Jnr 3200 Pa	% Rec. 100 Pa	% Rec. 3200 Pa	DTT Strain
2014-1	72	10.760	5.843	7.228	18.189	14.368	7.133	2.186	20.363	20.016	12.070	4.720	8.048
2014-2	52	9.206	5.504	8.472	11.343	23.598	4.651	2.543	19.850	17.336	5.312	4.362	30.979
2014-3	73	6.670	4.095	5.347	15.777	23.221	6.408	2.506	8.817	5.915	7.950	5.335	37.884
2014-4	69	7.780	2.733	8.730	11.549	15.452	8.069	2.975	11.001	11.328	4.454	6.044	20.593
2015-1	72	4.15	3.659	6.878	11.854	14.423	10.602	2.986	21.946	4.132	16.523	2.826	18.552
2015-2	66	48.6813	3.5255	9.2076	13.885	72.575464	5.750708	2.142825	29.61683	5.154988	26.72097	4.610388	36.64349
2015-3	69	13.3356	4.4147	8.0174	7.8859	15.285329	6.038911	2.054348	8.053945	18.90702	12.53481	30.53914	50.36555
2015-4	72	6.93449	3.3122	7.0742	11.465	15.349729	6.549548	2.640035	15.25514	4.718882	8.41301	4.678398	73.56208
2016-1	62	26.2663	3.967	6.9128	10.424	20.650786	7.371125	3.279961	25.7382	4.753085	29.48599	6.309624	21.62796
2016-2	74	9.35379	4.3545	6.6077	9.769	15.131773	8.633694	2.198488	14.13471	16.1848	13.86873	23.11892	70.70604
2016-3	64	12.5161	22.641	21.497	16.608	14.221102	5.999379	2.33875	55.38365	4.044346	115.6536	4.750328	41.51925
2016-4	72	28.1722	2.9891	6.2693	9.9115	17.39022	6.764994	4.719315	14.48671	3.160854	10.95691	2.507913	15.86679
2017-2	72	8.1892	2.9418	6.9766	12.404	25.015248	5.960391	2.305579	15.32323	20.04762	9.000087	20.78232	38.9118
2017-3	68	5.07204	7.8037	5.3053	16.576	12.811858	7.65849	2.261035	14.54116	3.656197	11.69038	4.017192	32.22362
2017-4	72	7.29502	3.7618	7.1225	7.8688	13.091449	7.085242	2.138683	7.235638	29.86519	7.175334	25.32789	38.60541
2018-1	72	6.70339	3.2264		18.537	16.120244	6.395676	2.814315	17.6796	3.240715	20.36877	4.21767	18.38078
2018-2	65	10.2401	3.2247		8.5454	16.987038	5.301906	2.285746	13.08987	42.04845	13.138	95.94854	25.74922
2018-3	74	7.46112	5.7239		9.7593	19.498873	6.97184	1.638225	7.07208	24.52983	11.72352	59.74421	24.22734
2018-4	64	13.3804	2.9787		15.593	14.267542	12.49947	5.858218	372.6974	30.4146	328.5556	26.97164	54.58176
2019-1	75	7.0211	2.9324		10.403	13.729654	5.989426	2.318013	7.221429	21.89445	7.063977	65.53669	37.34238
2019-2	74	13.2579	4.7082		11.84	13.212726	5.854851	3.05673	53.74261	22.0569	8.043793	50.80675	20.07887