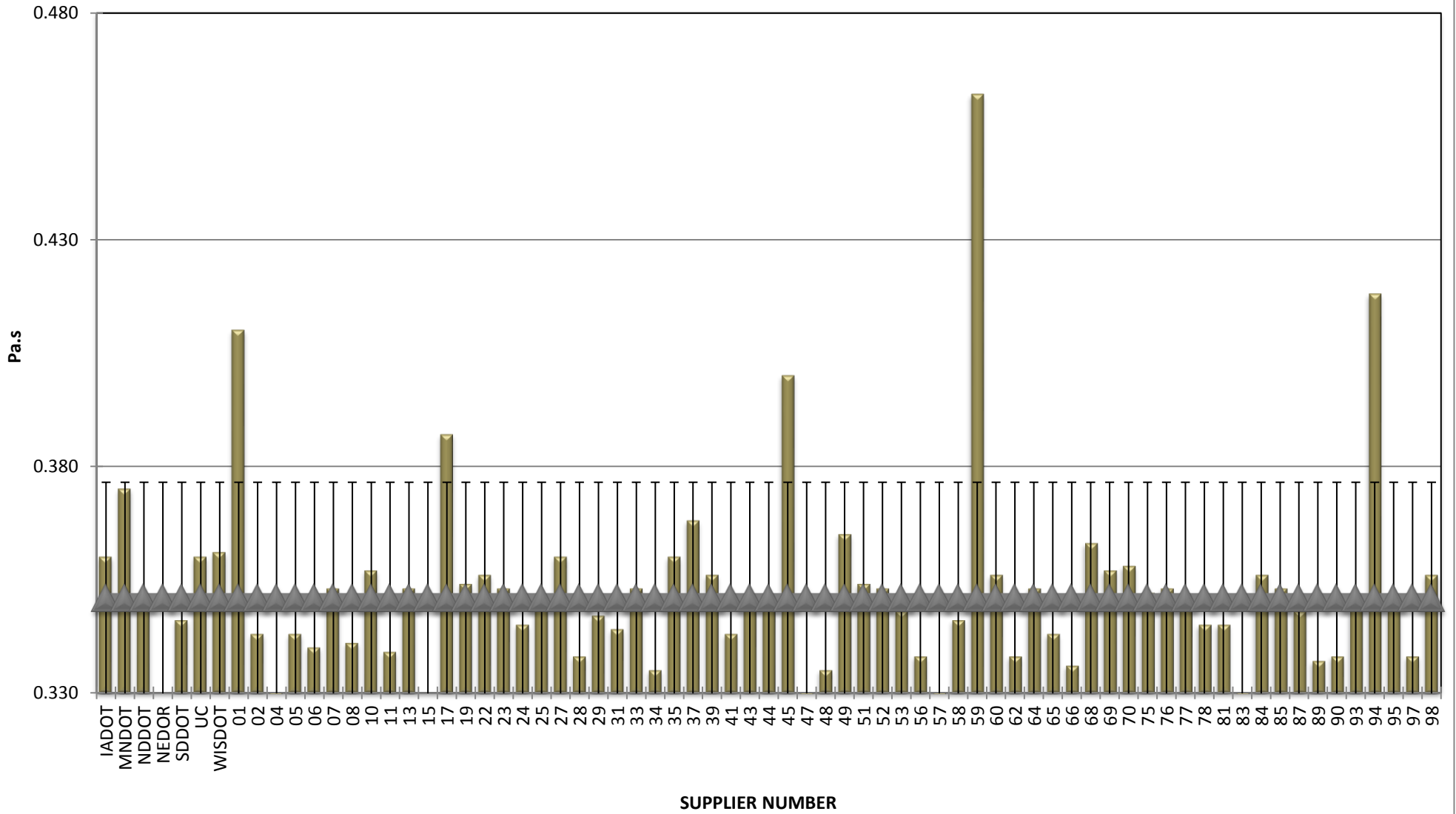


**COMBINED STATE BINDER GROUP ROUND ROBIN SUMMARY A 2017-4
PG 58S-28**

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	0.360	1.85	4.470	4,840	0.529	254	0.332	2.010	4.82	2.150	1.93
MNDOT	0.375	1.92	4.800	4,630	0.577	250	0.323	1.800	4.78	1.970	1.45
NDDOT	0.350	1.84	4.610	4,385	0.607	249	0.329	1.875	5.40	2.047	2.00
NEDOR	1.90	4.770	4,571	0.332	248	0.319	1.520	16.50	1.910	2.14	
SDDOT	0.346	2.03	4.920	4,280	0.426	203	0.338	1.738	5.00	1.921	2.59
UC	0.360	1.90	4.530	4,767	0.496	252	0.325	1.869	5.20	2.113	1.80
WISDOT	0.361	1.88	4.580	4,710	0.472	226	0.336	1.860	6.48	2.100	1.45
01	0.410	1.91	4.830	4,410	0.502	226	0.330	1.800	4.70	2.000	2.10
02	0.343	1.94	4.890	4,547	0.457	263	0.321	1.770	5.09	1.920	2.21
04	0.308	1.84	4.445	4,573	0.424	255	0.334	1.941	4.30	2.191	1.10
05	0.343	1.71	4.050	4,680	0.471	230	0.321	1.910	5.84	2.100	2.23
06	0.340	1.80	4.330	4,740	0.707	215	0.323	2.050	4.39	2.250	1.17
07	0.353	1.85	4.640	4,220	0.468	230	0.343	1.850	6.60	2.020	2.30
08	0.341	1.74	3.900	4,850	0.454	208	0.329	1.770	5.68	1.950	2.37
10	0.357	1.88	4.789	4,655	0.561	242	0.326	1.794	5.09	2.018	1.24
11	0.339	1.90	4.710	4,376	0.443	262	0.319	1.870	4.53	2.020	2.03
13	0.353	1.89	5.020	3,380	0.498	237	0.331	1.717	5.30	1.877	1.75
15	0.330	1.88	4.760	4,460	0.556	237	0.322	1.805	5.33	1.973	1.63
17	0.387	1.82	5.050	4,300	0.502	234	0.327	1.700	5.10	1.900	2.30
19	0.354	1.89	4.956	4,648	0.635	241	0.336	1.750	6.30	1.920	2.30
22	0.356	1.90	4.919	4,477	0.598	248	0.323	1.699	4.92	1.904	1.34
23	0.353	1.81	4.580	4,738	0.585	251	0.332	1.905	5.65	2.093	2.02
24	0.345	1.89	4.800	3,380	0.481	297	0.335	1.804	4.77	1.963	1.49
25	0.350	1.83	5.130	4,210	0.570	243	0.338				
27	0.360	1.85	4.440	4,510	0.585	248	0.332	1.908	5.01	2.102	1.32
28	0.338	1.95	5.460	4,639	0.502	277	0.312	1.560	5.74	1.680	2.69
29	0.347	2.01	4.530	4,532	0.560	253	0.329	1.930	6.07	2.130	2.01
31	0.344	1.73	4.110	4,730	0.491	211	0.322	1.980	4.43	2.140	2.16
33	0.353	1.89	4.820	4,890	0.469	240	0.322	1.792	5.45	1.969	1.61
34	0.335	1.96	4.450	4,660	0.504	246	0.325	1.940	4.82	2.130	1.83
35	0.360	1.91	4.800	4,690	0.513	248	0.330				
37	0.368	1.83	4.330	4,800	0.575	246	0.334	2.000	5.30	2.200	1.90
39	0.356	1.87	4.820	4,930	0.557	240	0.323	1.782	5.08	1.942	1.65
41	0.343	1.71	4.000	4,595	0.471	219	0.320	1.640	6.24	1.810	2.74
43	0.351	1.93	4.840	4,100	0.543	249	0.334	1.772	5.41	1.941	1.56
44	0.351	1.88	4.849	4,863	0.556	244	0.320	1.730	4.92	1.944	1.08
45	0.400	1.87	4.900	4,770	0.492	228	0.325	1.800	4.90	1.900	2.10
47	0.313	1.85	4.218	4,274	0.328	233	0.330	2.050	4.30	2.304	1.00
48	0.335	1.92	4.250	4,780	0.496	269	0.329	2.040	4.98	2.230	1.73
49	0.365	1.93	4.830	4,810	0.542	246	0.326	1.779	5.32	1.958	1.66
51	0.354	1.93	5.142	4,351	0.639	234	0.334	1.700	6.60	1.870	2.40
52	0.353	1.85	4.927	4,678	0.586	247	0.322	1.746	5.37	1.962	1.38
53	0.348	1.88	4.320	4,384	0.563	254	0.332	2.080	3.73	2.330	
56	0.338	1.84	4.580	4,750	0.546	270	0.327	1.880	5.91	2.090	1.55
57	0.310	1.82	4.213	4,024	0.421	238	0.330	2.041	4.30	2.308	1.00
58	0.346	1.88	4.680	4,890	0.552	238	0.329	1.809	5.03	1.977	1.43
59	0.462	2.11	4.918	3,820	0.479	256	0.327	1.680	8.45	1.930	2.39
60	0.356	1.96	5.280	5,550	0.630	258	0.324	1.636	5.51	1.790	1.79
62	0.338	1.92	4.920	4,548	0.480	267	0.323	1.740	6.16	1.910	2.26
64	0.353	1.89	4.460	4,585	0.563	246	0.323	1.980	3.99	2.230	
65	0.343	1.67	4.050	4,170	0.490	215	0.320	2.170	4.59	2.370	1.86
66	0.336	1.91	5.180	4,837	0.472	269	0.315	1.610	7.77	1.800	2.57
68	0.363	1.86	4.590	4,836	0.555	253	0.334	1.770	10.26	2.020	2.68
69	0.357	1.92	4.570	4,421	0.487	252	0.326	1.824	6.30	2.108	1.90
70	0.358	1.90	4.680	4,700	0.449	245	0.331	1.782	5.77	1.954	2.17
75	0.352	1.90	4.714	4,366	0.548	247	0.323	1.816	5.38	2.042	1.00
76	0.353	1.90	4.500	4,940	0.494	244	0.333	1.932	4.52	2.100	1.37
77	0.350	1.93	5.250	5,090	0.574	204	0.350	1.723	5.47	1.903	1.64
78	0.345	1.85	4.790	4,670	0.557	238	0.330	1.834	5.39	2.018	1.40
81	0.345	1.89	4.930	4,975	0.551	241	0.328	1.781	5.23	1.950	1.56
83	0.244	1.85	4.460	4,940	0.559	218	0.306	1.920	5.59	2.110	2.08
84	0.356	1.84	4.820	5,140	0.578	260	0.326	1.799	4.91	1.964	1.61
85	0.353	1.88	4.760	5,180	0.490	242	0.329	1.815	4.86	1.938	1.62
87	0.348	1.88	4.770	4,480	0.528	242	0.324	1.804	5.12	1.970	1.60
89	0.337	1.85	4.760	4,410	0.556	242	0.324	1.810	4.87	1.970	1.60
90	0.338	1.94	5.160	4,285	0.468	269	0.317	1.620	7.88	1.820	2.56
93	0.350	1.82	4.550	4,409	0.558	252	0.324	1.930	5.46	2.110	1.95
94	0.418	1.88	5.200	4,255	0.627	226	0.327	1.650	5.80	1.820	2.53
95	0.351	2.03	4.740	3,940	0.496	248	0.326	1.839	4.33	1.992	1.41
97	0.338	1.91	5.095	4,870	0.649	244	0.330	1.710	5.80	1.850	2.30
98	0.356	1.90	5.242	4,473	0.653	256	0.330	1.660	6.70	1.810	2.50
99	0.330	1.97	5.390	4,835	0.467	277	0.313	1.580	6.03	1.720	2.68
Average	0.351	1.88	4.719	4,572	0.525	244	0.327	1.817	5.61	2.006	1.86
Std. Dev.	0.026	0.07	0.336	360	0.069	17	0.007	0.131	1.68	0.144	0.47
Coef. of Var.	7.295	3.76	7.122	8	13.091	7	2.139	7.236	29.87	7.175	25.33

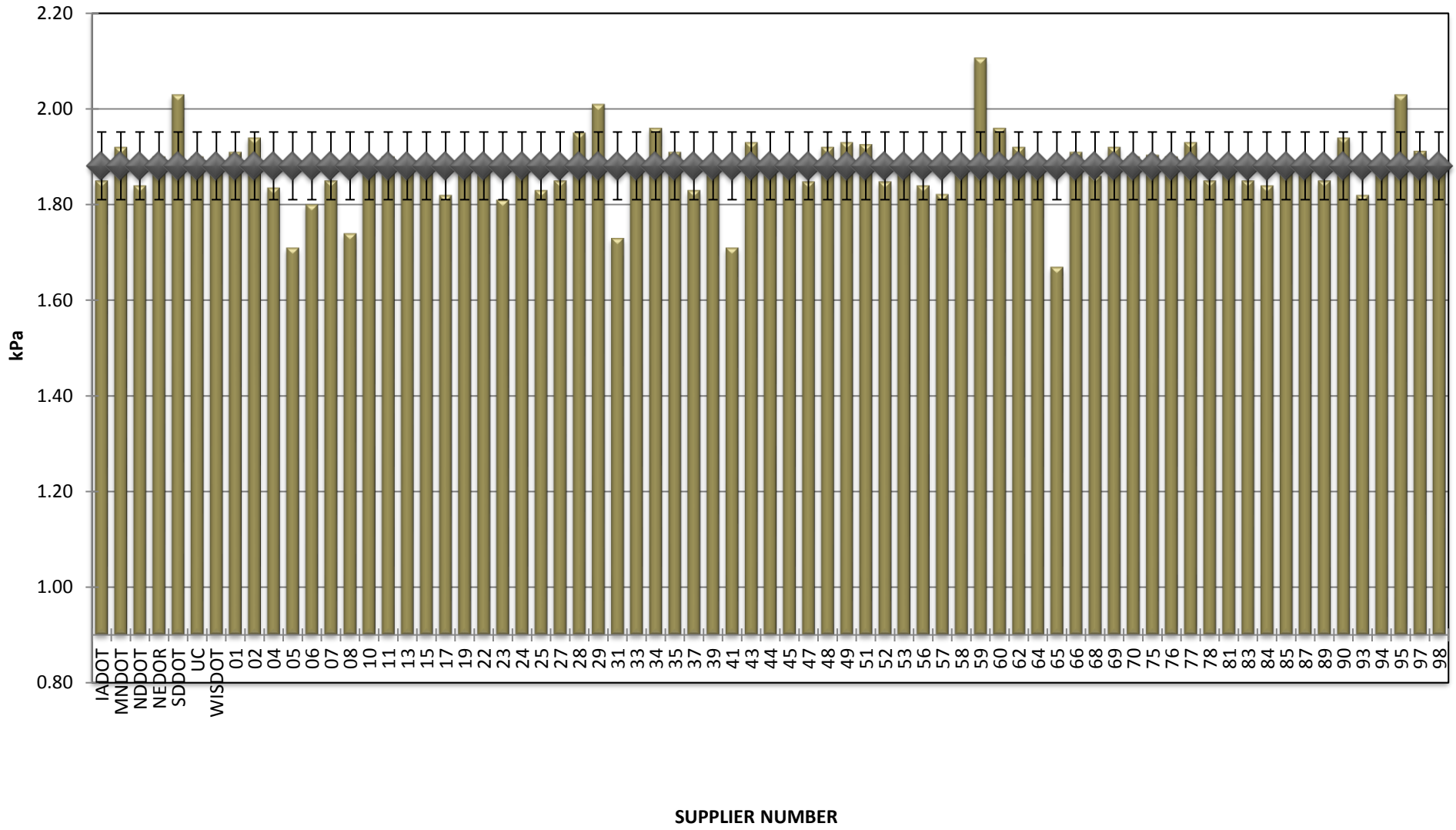
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2017-4
PG 58S-28**

ROTATIONAL VISCOSITY



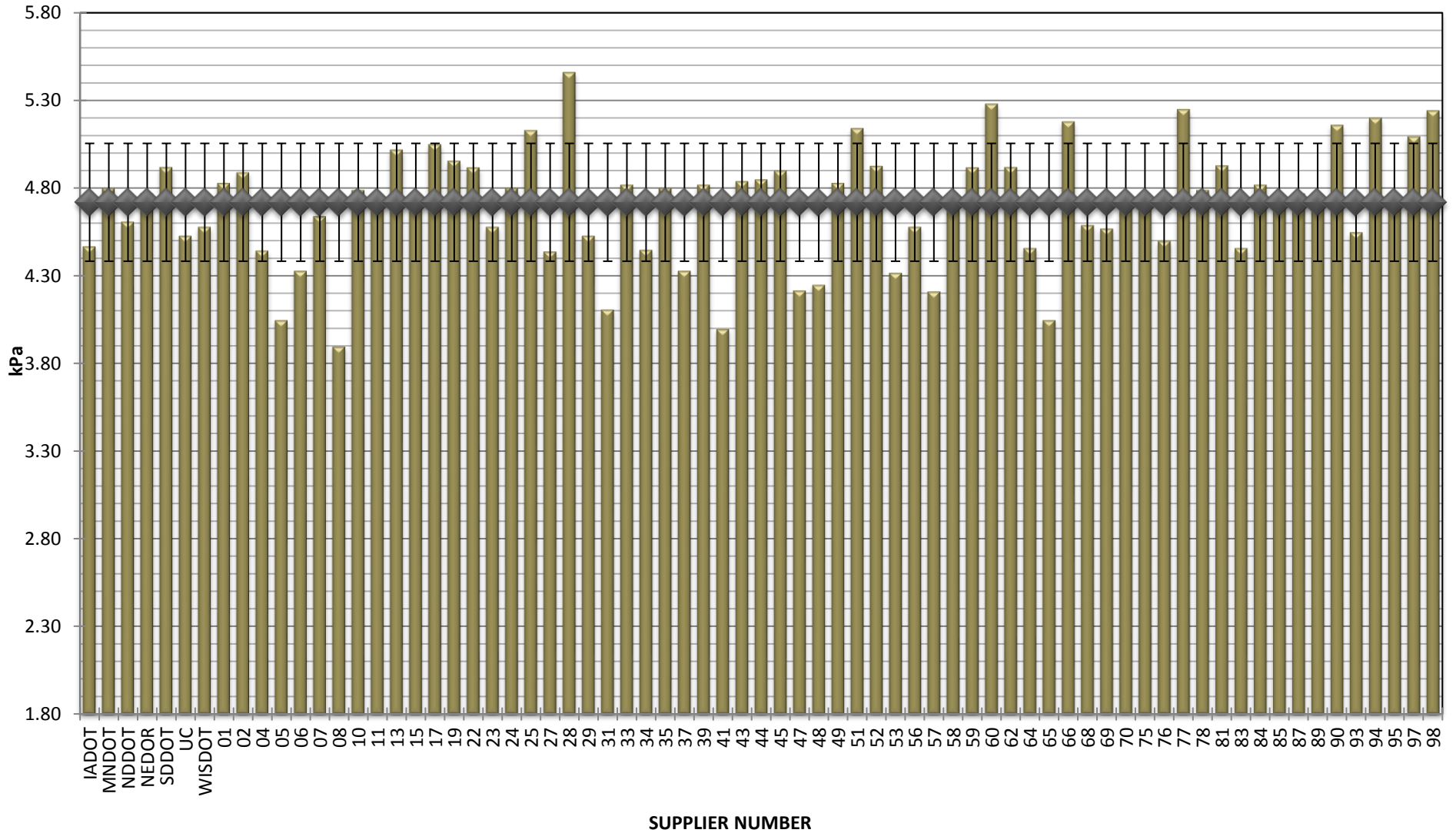
**COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - ORIGINAL



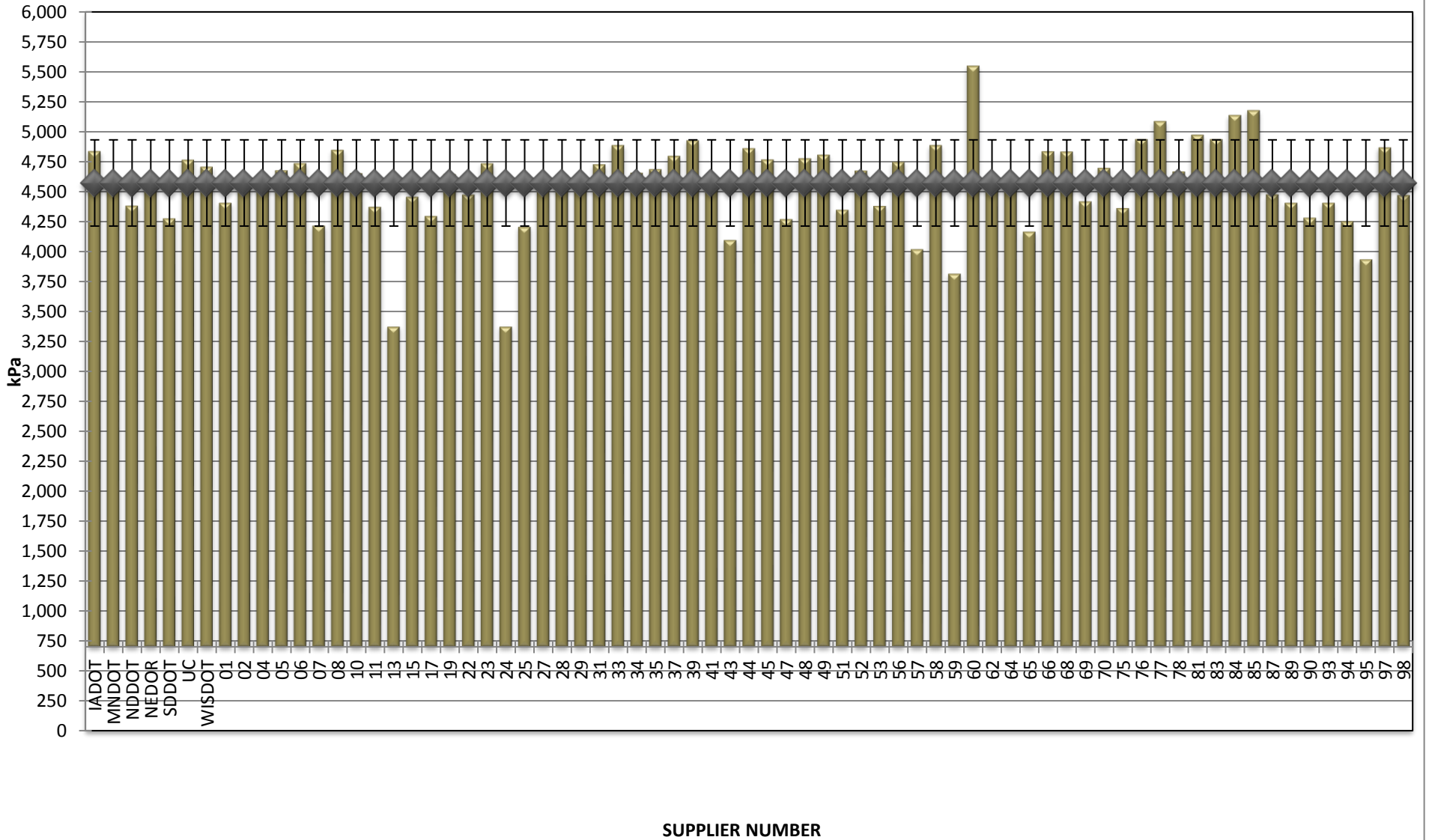
**COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - RTFO



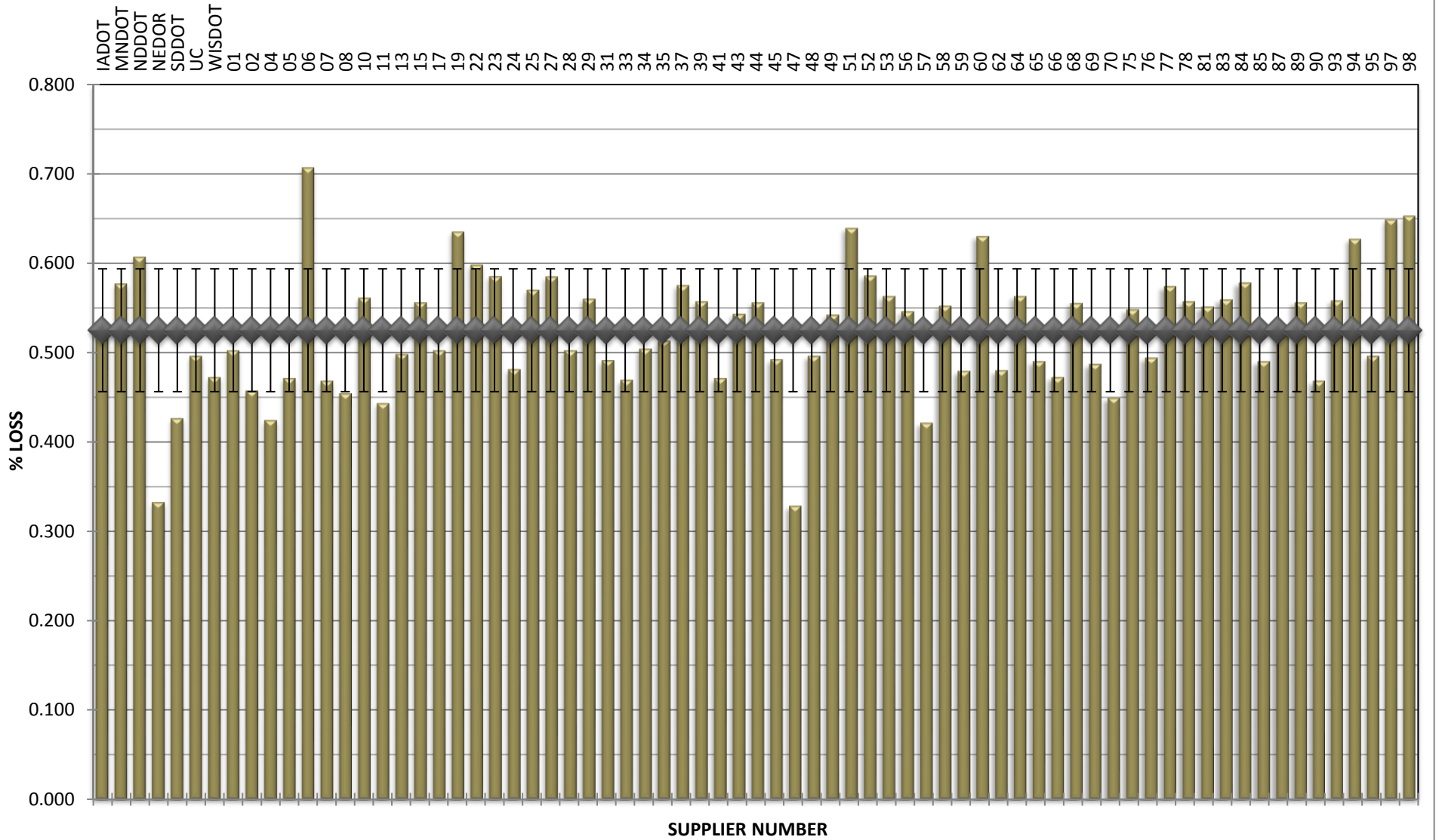
**COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - PAV



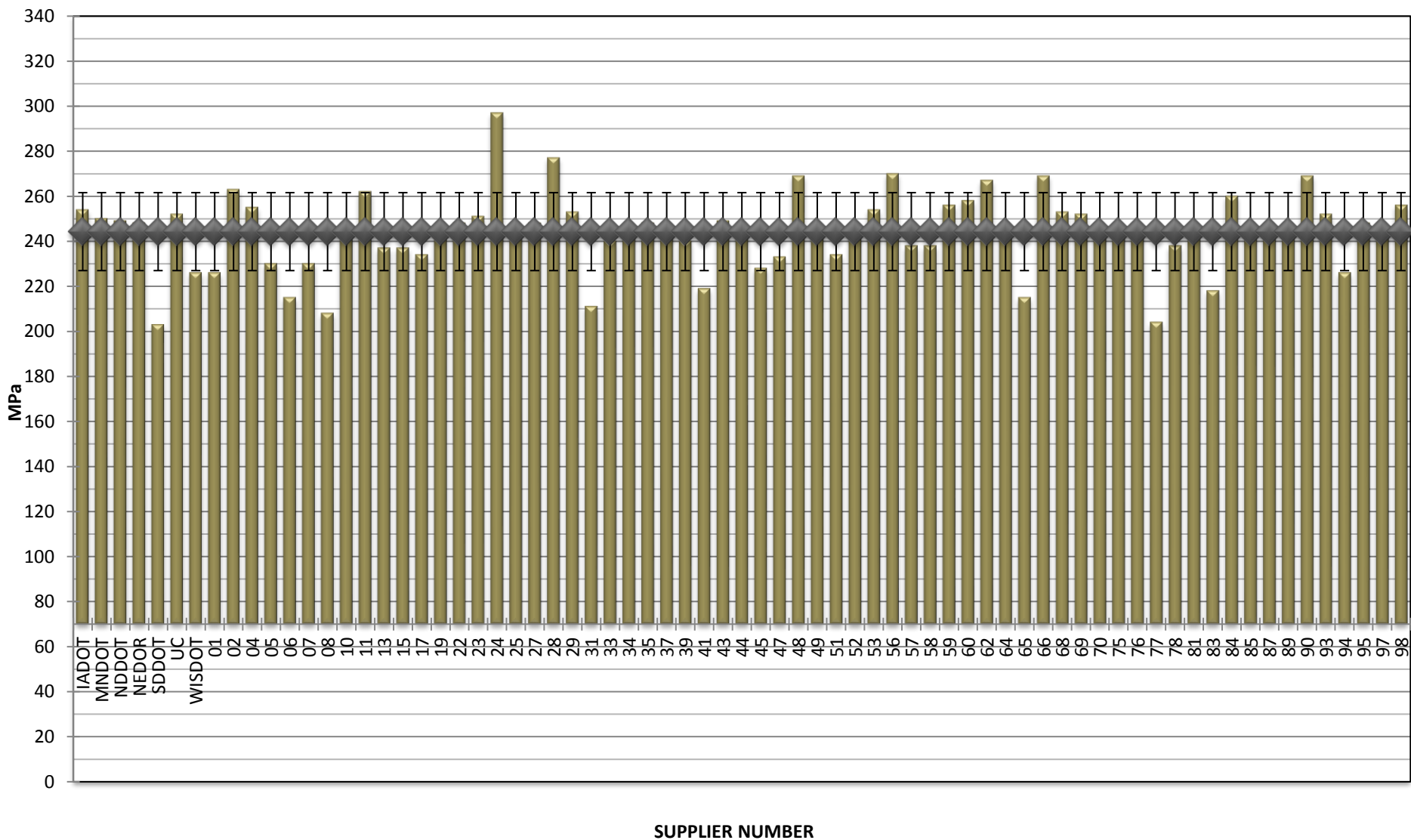
**COMBINED STATE BINDER GROUP ROUND ROBIN
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RTFO MASS LOSS



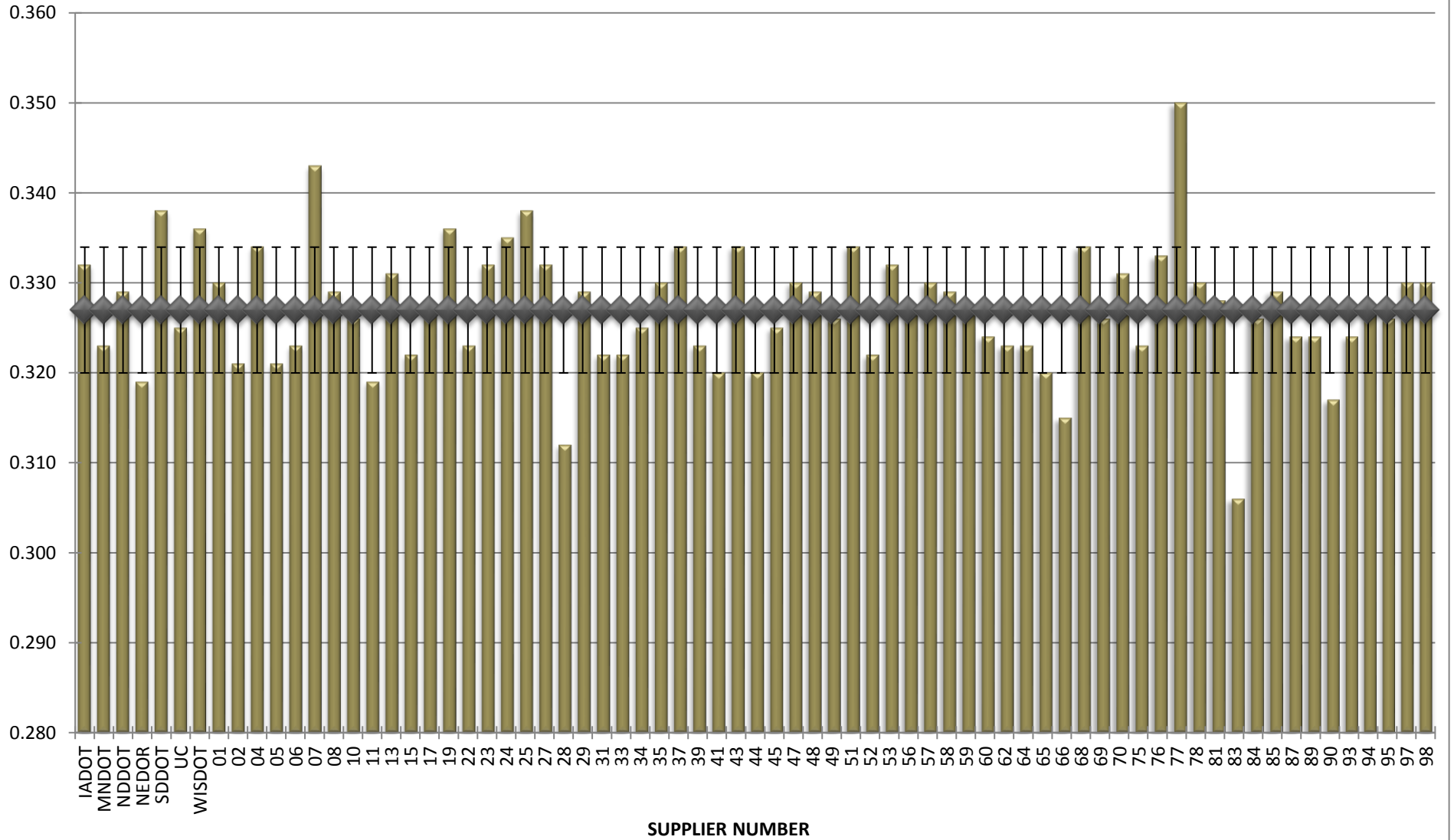
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BBR STIFFNESS



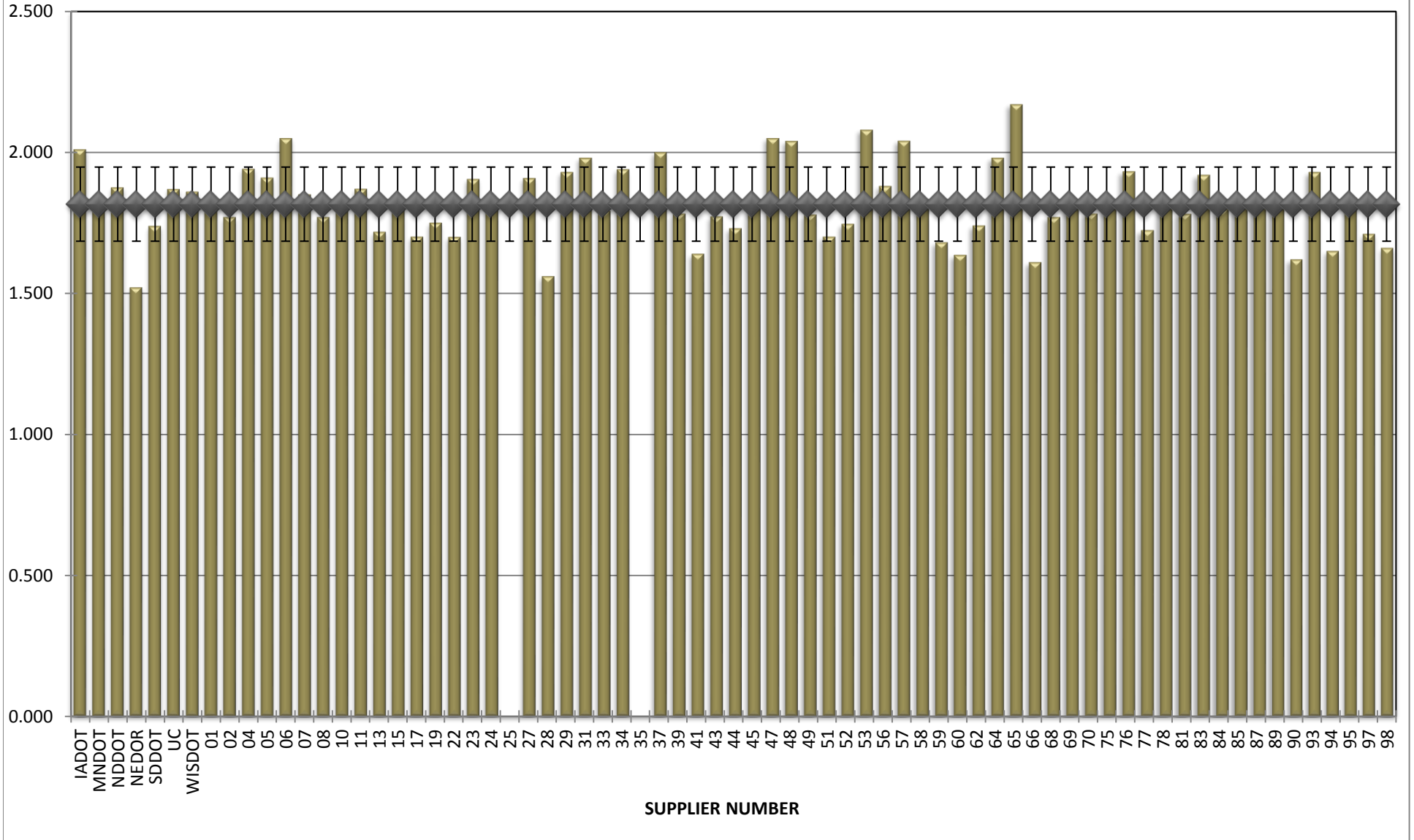
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BBR m-VALUE



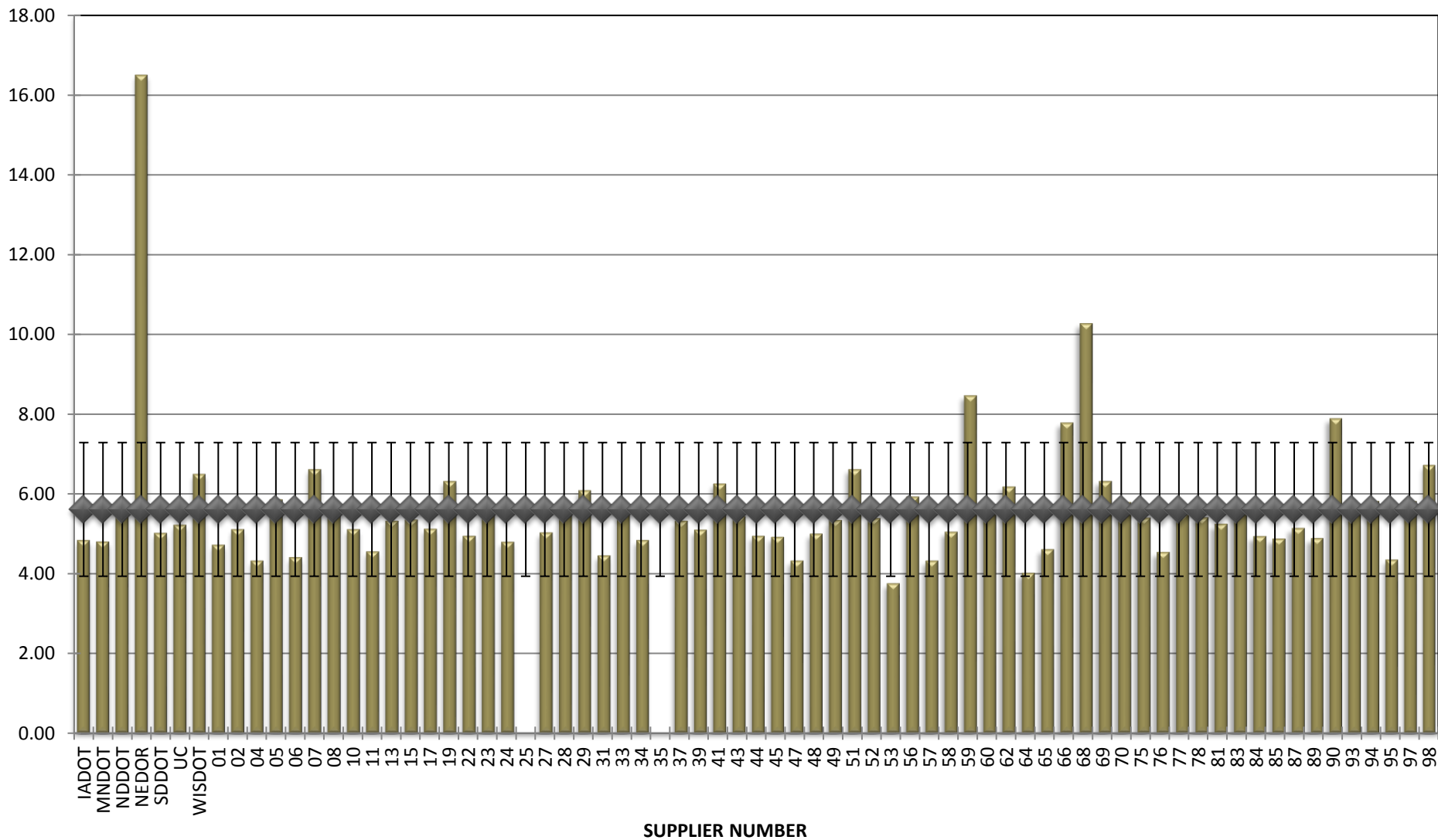
**COMBINED STATE BINDER GROUP ROUND ROBIN
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Jnr @ 100 Pa



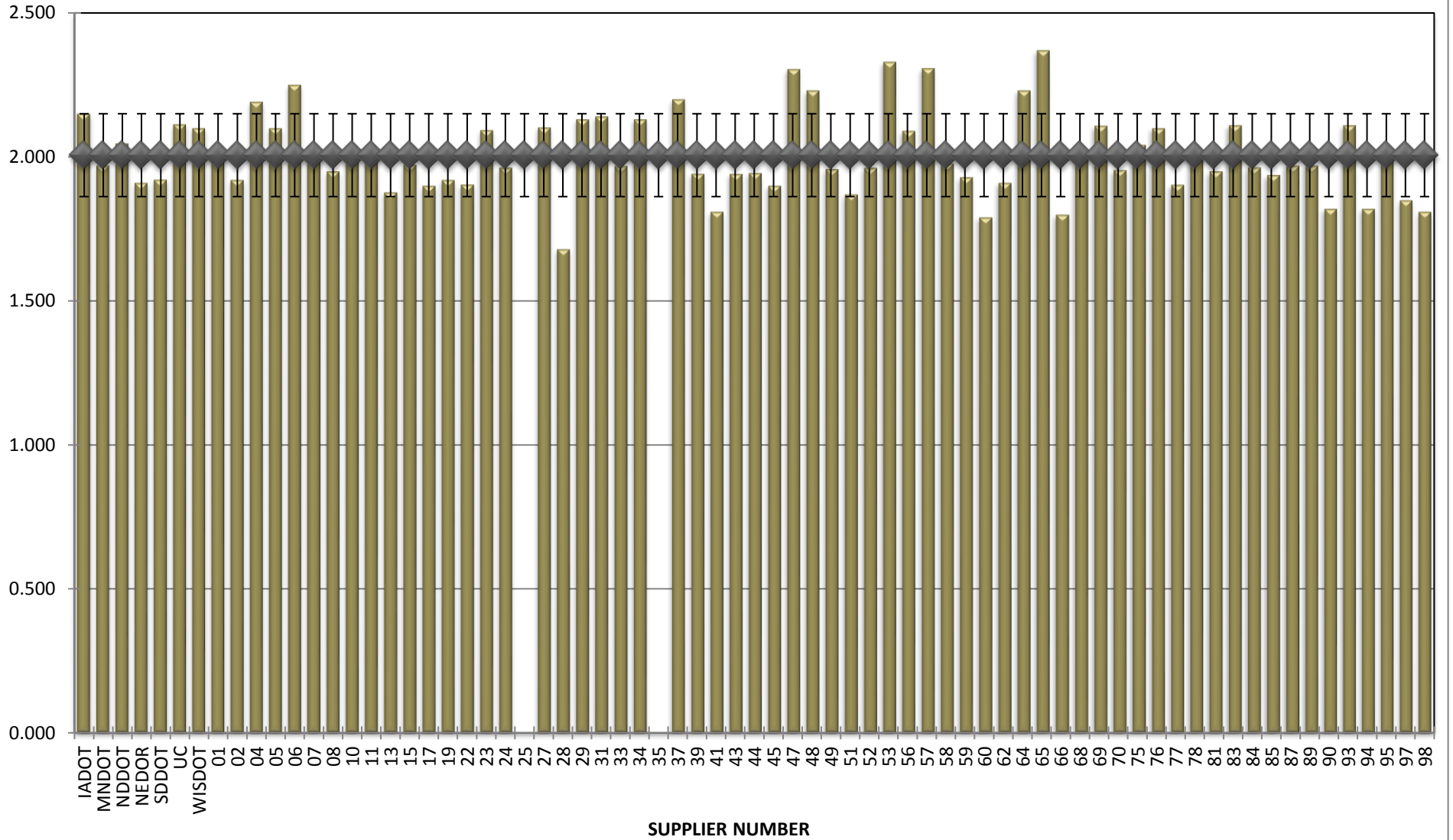
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2017-4
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% Recovery @ 100 Pa



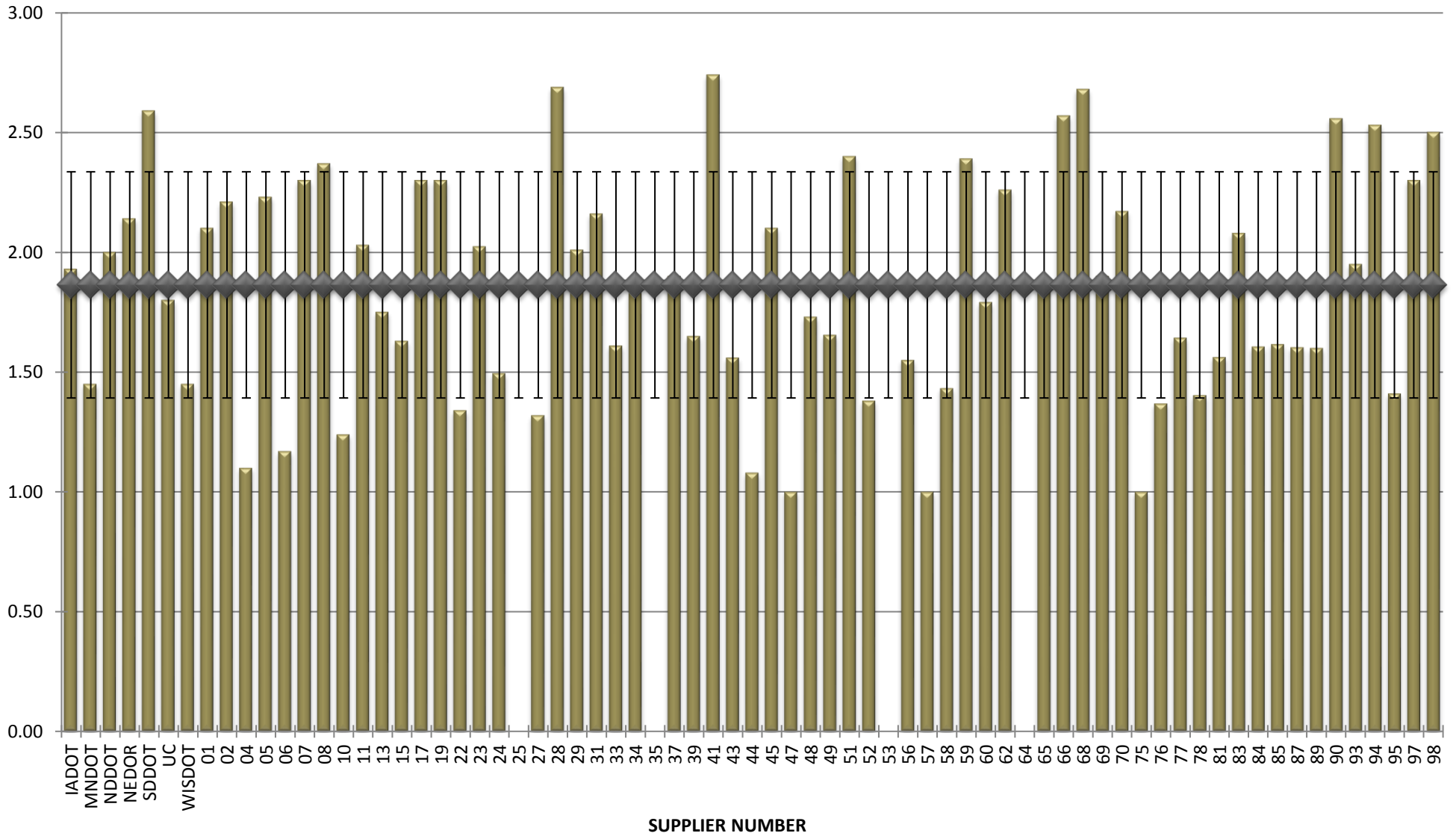
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2017-4
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Jnr @ 3200 Pa



**COMBINED STATE BINDER GROUP ROUND ROBIN
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% Recovery @ 3200 Pa



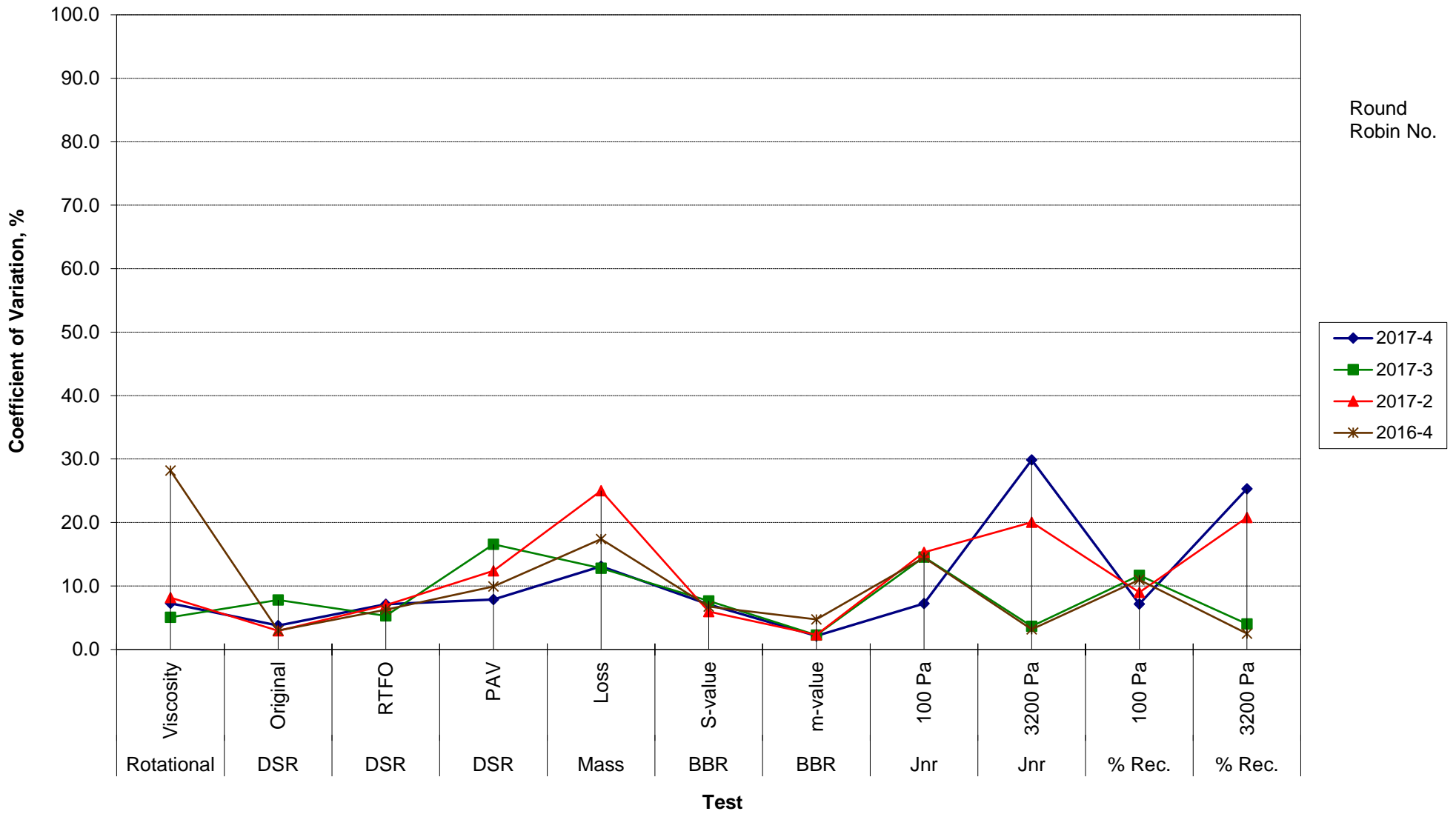
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

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
2017-4	72	7.295	3.762	7.122	7.869	13.091	7.085	2.139	7.236	29.865	7.175	25.328	38.605
2017-3	68	5.072	7.804	5.305	16.576	12.812	7.658	2.261	14.541	3.656	11.690	4.017	32.224
2017-2	72	8.189	2.942	6.977	12.404	25.015	5.960	2.306	15.323	20.048	9.000	20.782	38.912
2016-4	72	28.172	2.989	6.269	9.911	17.390	6.765	4.719	14.487	3.161	10.957	2.508	15.867

**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	0.351	1.88	4.72	4,606	0.525	244	0.327	1.817	5.45	2.006	1.86
Std. Dev.	0.0180	0.0654	0.3287	302.27	0.0689	15.85	0.0063	0.1292	1.0453	0.1407	0.4648
Coef. of Var.	5.124	3.483	6.966	6.562	13.117	6.506	1.931	7.113	19.166	7.015	24.933

**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