

COMBINED STATE BINDER GROUP ROUND ROBIN SUMMARY A 2016-2
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	0.356	1.87	4.470	4,610	0.496	253	0.326	1.960	5.29	2.100	1.95
MNDOT		1.88	4.680	4,990	0.534	194	0.321	1.870	4.34	2.030	1.27
NDDOT	0.373	1.88	4.470	4,430	0.532	259	0.330	1.946	6.10	2.149	1.80
NEDOR		1.84	4.600		0.452			1.780	5.85	1.950	2.15
SDDOT	0.342	1.88	4.610	4,830	0.388	231	0.344	1.940	4.51	2.170	1.95
UC	0.348	1.86	4.297	4,880	0.489	255	0.325	1.981	5.30	2.250	1.60
UW	0.380	1.95	4.780	4,172	0.297	199	0.328	1.320	2.67	2.070	
WISDOT	0.360	1.96	4.720	4,320	0.461	244	0.333	1.835	4.49	1.994	1.32
01	0.360	2.07	5.480	3,830	0.536	245	0.322	1.700	5.80	1.800	2.20
02	0.361	1.87	4.660	4,665	0.465	265	0.323	1.870	4.96	2.038	1.97
04	0.338	1.75	4.005	3,984	0.423	202	0.338				
05	0.351	1.88	4.734	4,514	0.566	251	0.320	1.794	5.17	2.022	1.07
06	0.353	1.78	4.400	4,620	0.647	185	0.325	1.980	5.00	2.200	1.00
07	0.374	1.91	4.610	4,400	0.471	226	0.344	1.920	5.36	2.120	1.32
08	0.353	1.88	4.783	4,412	0.530	240	0.321	1.803	4.67	2.017	1.18
10	0.353	1.88	4.847	4,505	0.591	243	0.318	1.741	5.02	1.956	1.45
11	0.357	1.87	4.930	4,332	0.455	271	0.323	1.752	5.41	1.906	2.16
13	0.343	1.78	4.230	4,420	0.596	240	0.337	2.050	5.54	2.290	1.27
15	0.343	1.89	4.790	4,680	0.509	254	0.335	1.811	4.69	1.967	1.53
17	0.355	2.16	5.450	4,280	0.522	242	0.322	1.600	6.30	1.800	2.40
19	0.353	1.82	4.850	4,820	0.546	239	0.342	1.807	6.50	1.990	2.30
22	0.353	1.89	4.732	4,286	0.547	244	0.320	1.802	4.27	1.997	1.44
23	0.340	2.08	4.710	4,492	0.651	253	0.338	1.850	5.15	2.010	2.01
24	0.356	1.77	4.550	4,540	0.581	233	0.335	1.850	5.48	2.060	1.50
25	0.365	1.83	4.727	4,158	0.460	247	0.338	1.919	6.02	1.842	2.02
27	0.330	1.87	4.750	4,300	0.552	237	0.327	1.856	4.85	2.032	1.31
28	0.348	1.82	4.420	3,725	0.415	285	0.316	1.971	5.51	2.165	1.84
29	0.354	1.75	4.610	4,065	0.503	260	0.328	1.896	4.78	2.070	1.89
31	0.352	1.88	4.713	4,351	0.585	251	0.323	1.819	4.25	2.029	1.11
33	0.348	1.86	4.640	4,520	0.437	229	0.328	1.880	4.72	2.053	1.41
34	0.344	1.91	4.260	4,561	0.479	258	0.328	2.075	4.22	2.258	1.72
35	0.360	2.01	4.770	4,610	0.540	243	0.324				
37	0.315	1.93	4.770	4,909	0.389	261	0.331	1.820	5.96	2.000	2.00
39	0.333	1.86	4.560	3,980	0.515	249	0.333	1.903	4.95	2.082	1.38
41	0.353	1.89	4.717	4,323	0.536	248	0.330	1.819	4.66	2.028	1.25
42	0.347	1.87	5.700	4,147	0.252	237	0.337	1.613	5.23	1.750	1.97
43	0.376	1.98	4.770	4,970	0.466	226	0.345	2.030	4.34	2.200	1.20
44	0.351	1.91	4.812	4,123	0.584	246	0.323	1.779	4.67	1.988	1.19
45	0.380	2.18	5.360	4,050	0.538	224	0.321	1.500	6.30	1.600	2.60
47	0.333	1.83	4.031	4,236	0.504	243	0.333				
48	0.342	1.92	4.420	4,852	0.480	270	0.325	2.025	4.09	2.197	1.76
49	0.353	1.83	4.630	4,120	0.533	242	0.338	1.859	5.06	2.034	1.54
51	0.354	1.82	4.592	4,559	0.526	237	0.338	1.898	6.20	2.082	2.00
52	0.352	1.87	4.757	4,430	0.539	248	0.317	1.788	4.76	1.998	1.41
53	0.325	1.80	3.960	4,191	0.455	241	0.326				
56	0.357	1.85	4.710	4,490	0.533	285	0.323	1.852	5.04	2.030	1.30
57	0.325	1.77	3.797	3,907	0.422	232	0.334				
58	0.345	1.83	4.500	4,530	0.675	238	0.334	1.954	4.97	2.151	1.26
59	0.375	1.93	4.547	4,276	0.441	261	0.326				
60	0.342	1.84	4.500	4,870	0.567	227	0.315	0.002	4.91	0.002	1.61
62	0.357	1.87	4.610	4,610	0.487	283	0.323	1.907	4.55	2.088	1.23
64	0.340	1.80	4.276	4,352	0.510	246	0.334				
65	0.341	1.90	4.780	4,360	0.561	229	0.332	1.782	5.24	1.969	1.76
66	0.344	1.84	4.700	4,014	0.415	270	0.320	1.818	4.79	1.973	2.13
68	0.345	1.91	4.620	4,915	0.511	252	0.326	1.812	7.32	1.990	2.33
69	0.351	1.86	4.355	4,632	0.488	261	0.323	1.907	5.70	2.170	1.70
70	0.380	1.84	4.920	3,660	0.489	246	0.338	1.900	5.35	2.100	1.96
73	0.350	1.88	4.750	4,512	0.551	261	0.330	1.831	4.35	1.990	1.33
76	0.348	1.99	5.040	5,960	0.462	244	0.332	1.708	5.34	1.867	1.77
77	0.350	1.84	4.520	5,220	0.528	248	0.327	1.757	4.23	1.915	1.55
78	0.348	1.83	4.800	4,430	0.654	241	0.335	1.806	4.80	1.972	1.45
81	0.345	1.83	4.700	4,880	0.660	250	0.330	1.851	5.05	2.026	1.38
83	0.179	1.83	4.615	3,966	0.476	229	0.341	1.906	4.98	2.084	1.93
84	0.339	1.82	4.430	4,726	0.570	247	0.328	1.966	5.16	2.186	1.32
85	0.348	2.02	5.020	5,580	0.474	244	0.330	1.680	7.03	1.900	1.68
87	0.337	2.01	4.540	4,770	0.495	239	0.332	1.921	4.71	2.098	1.34
89	0.341	1.87	4.550	4,120	0.516	242	0.331	1.851	7.80	2.103	1.35
90	0.333	1.83	4.580	4,196	0.405	316	0.318	1.891	5.82	2.092	1.94
93	0.335	1.93	4.770	4,463	0.646	253	0.334	1.770	5.76	1.940	2.19
94	0.538	1.83	4.540	4,635	0.460			2.050	4.89		1.70
95	0.370	1.91	4.760	5,160	0.510	250	0.330	1.800	6.60	1.960	2.30
97	0.356	1.86	4.754	5,069	0.576	237	0.335	1.858	5.30	2.016	2.10
98	0.354	1.82	4.854	4,917	0.594	249	0.338	1.793	7.10	1.992	2.30
99	0.359	1.84	4.850	3,006	0.407	313	0.324	1.793	5.48	1.966	2.08

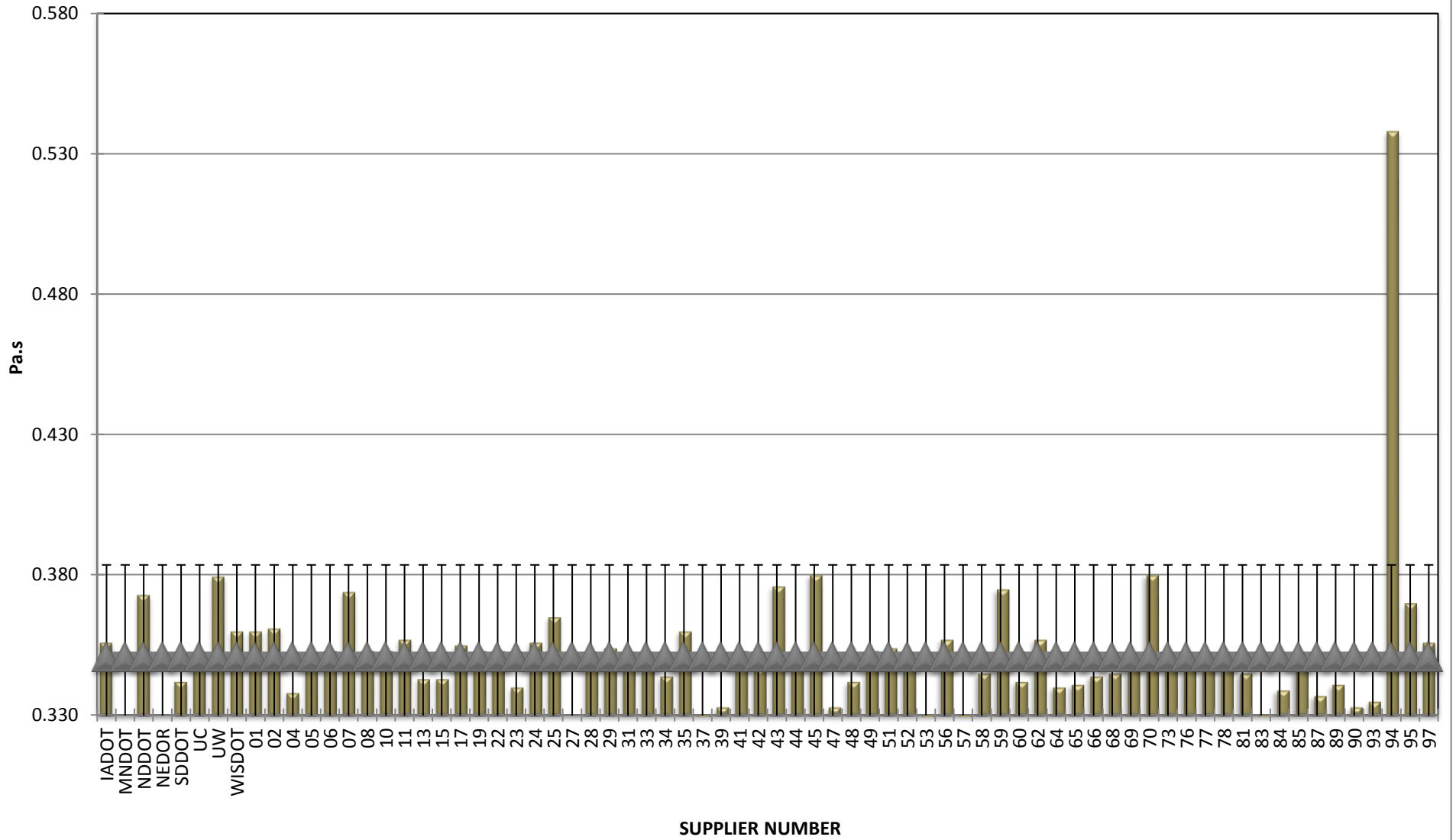
Average
Std. Dev.

0.351
0.033

Prepared by Iowa Department of Transportation 10/7/2016

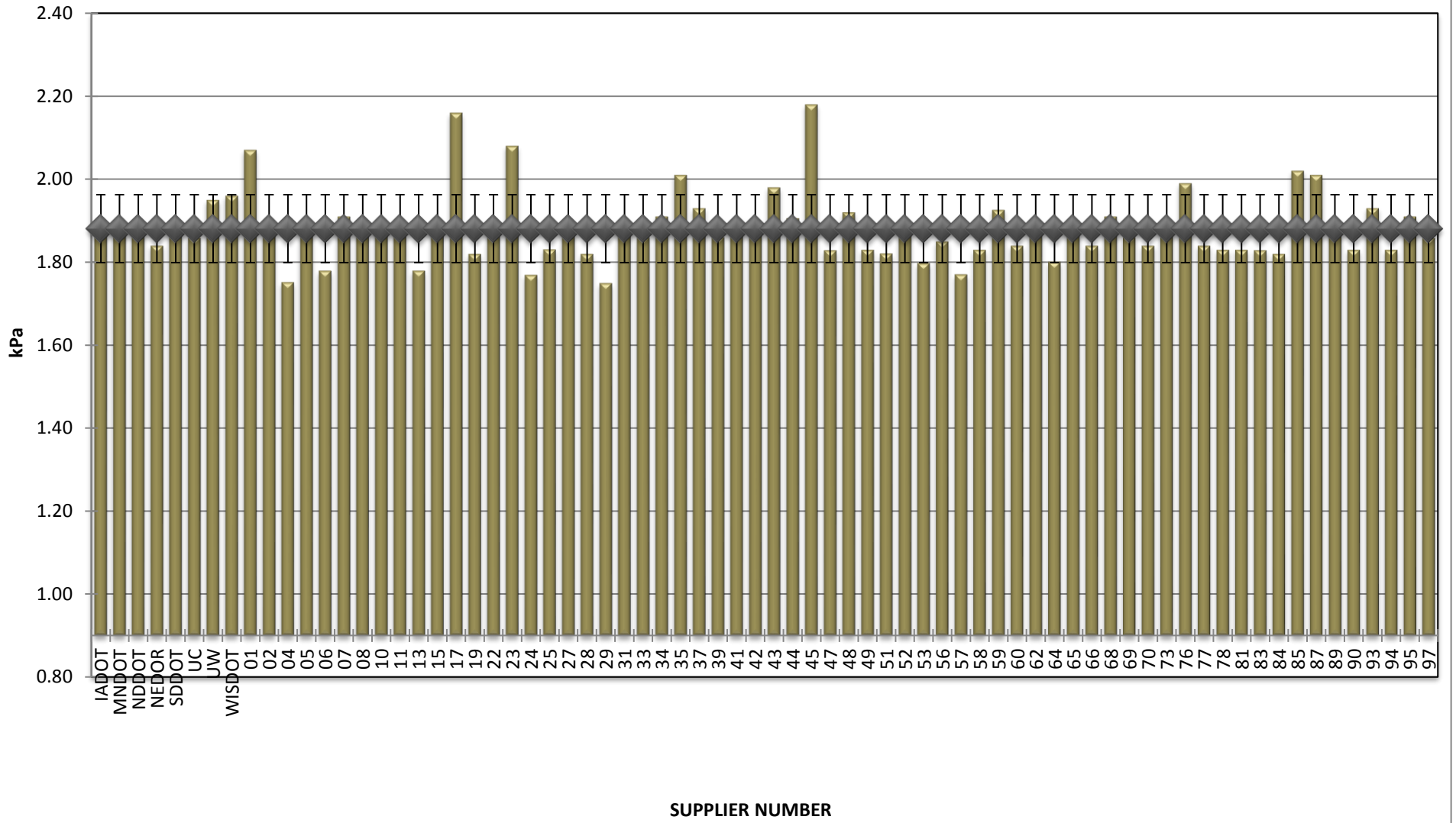
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2016-2
PG 58S-28**

ROTATIONAL VISCOSITY



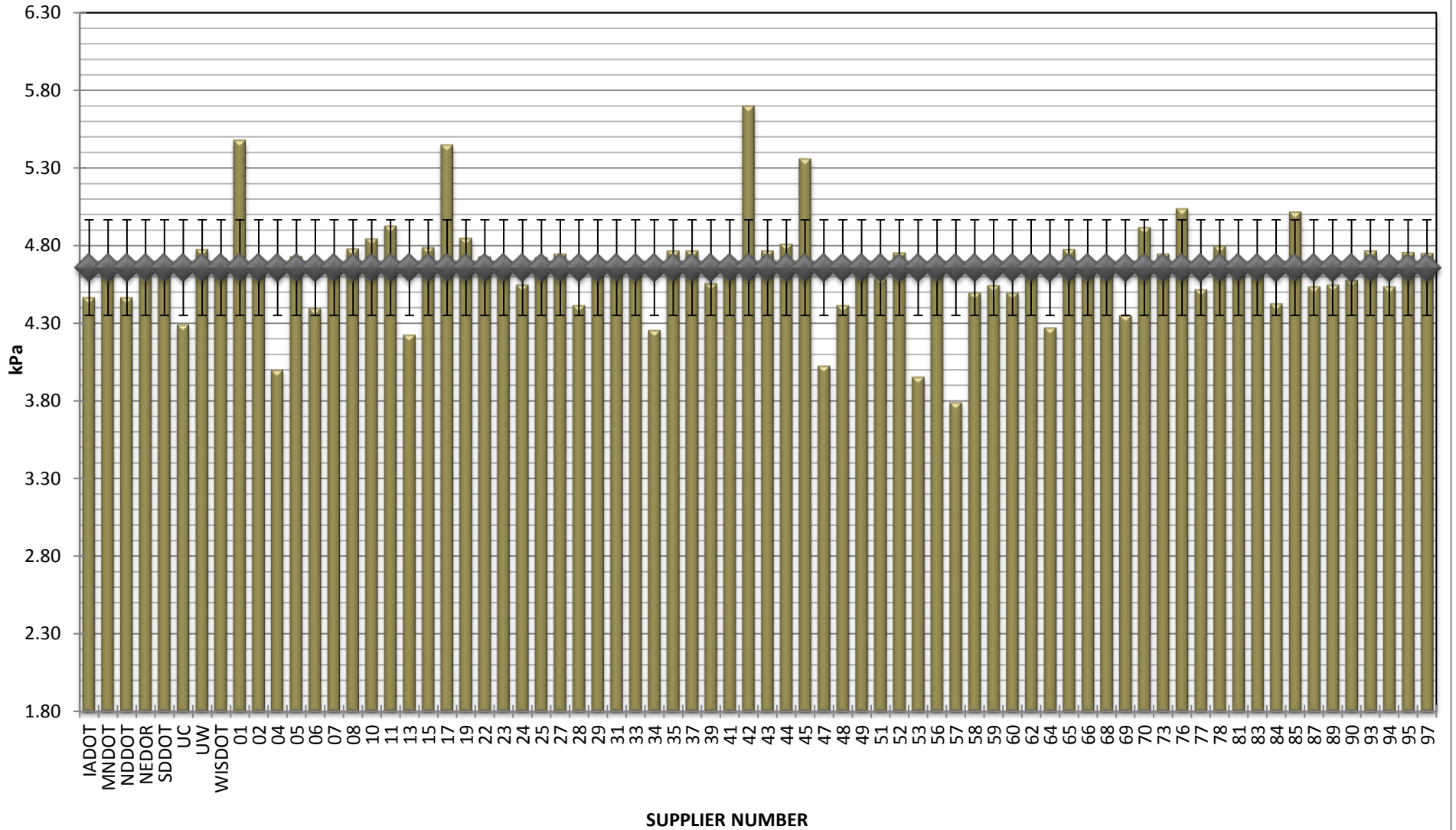
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SUMMARY A 2016-2
PG 58S-28**

DSR - ORIGINAL



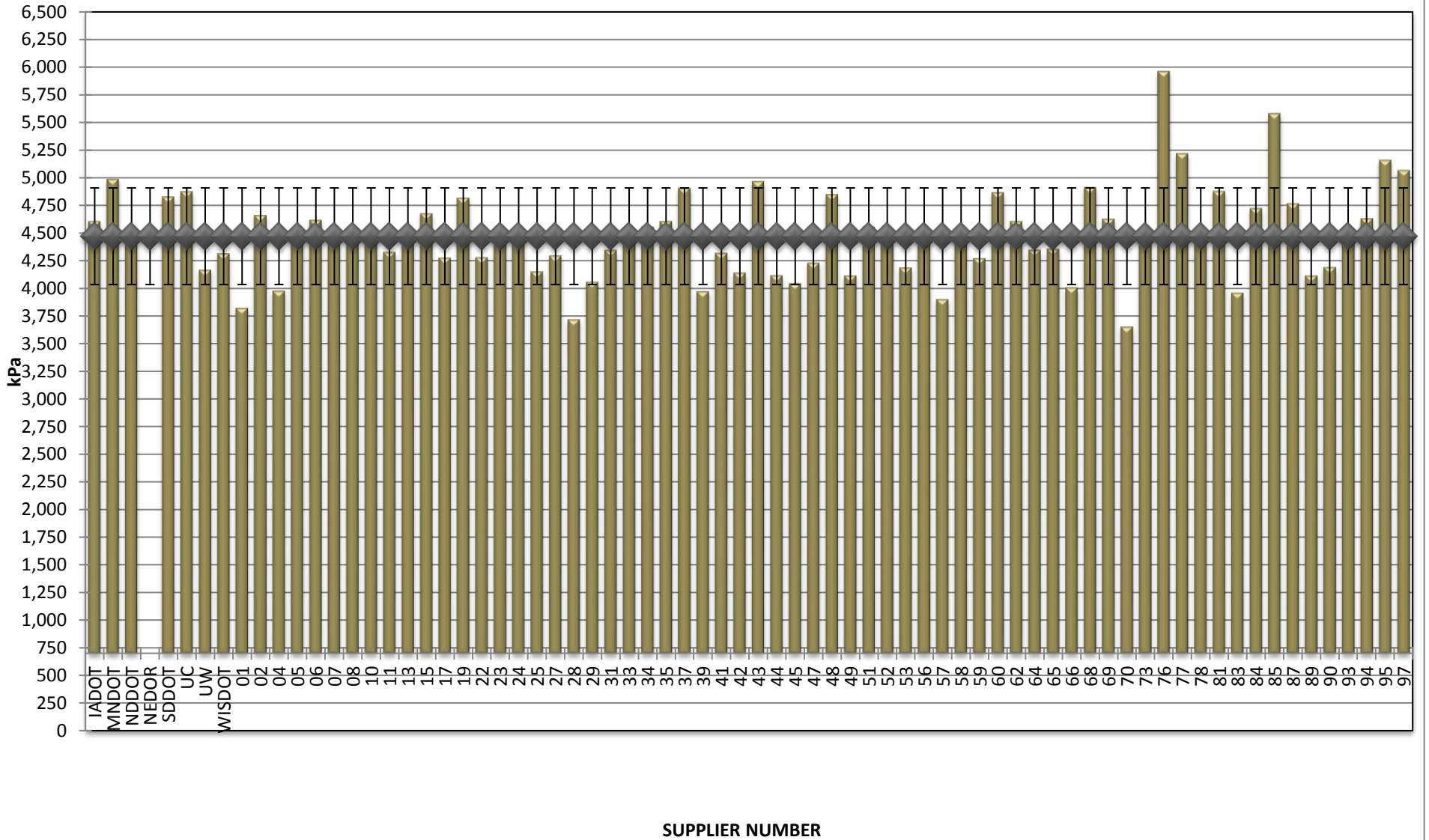
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SUMMARY A 2016-2
PG 58S-28**

DSR - RTFO



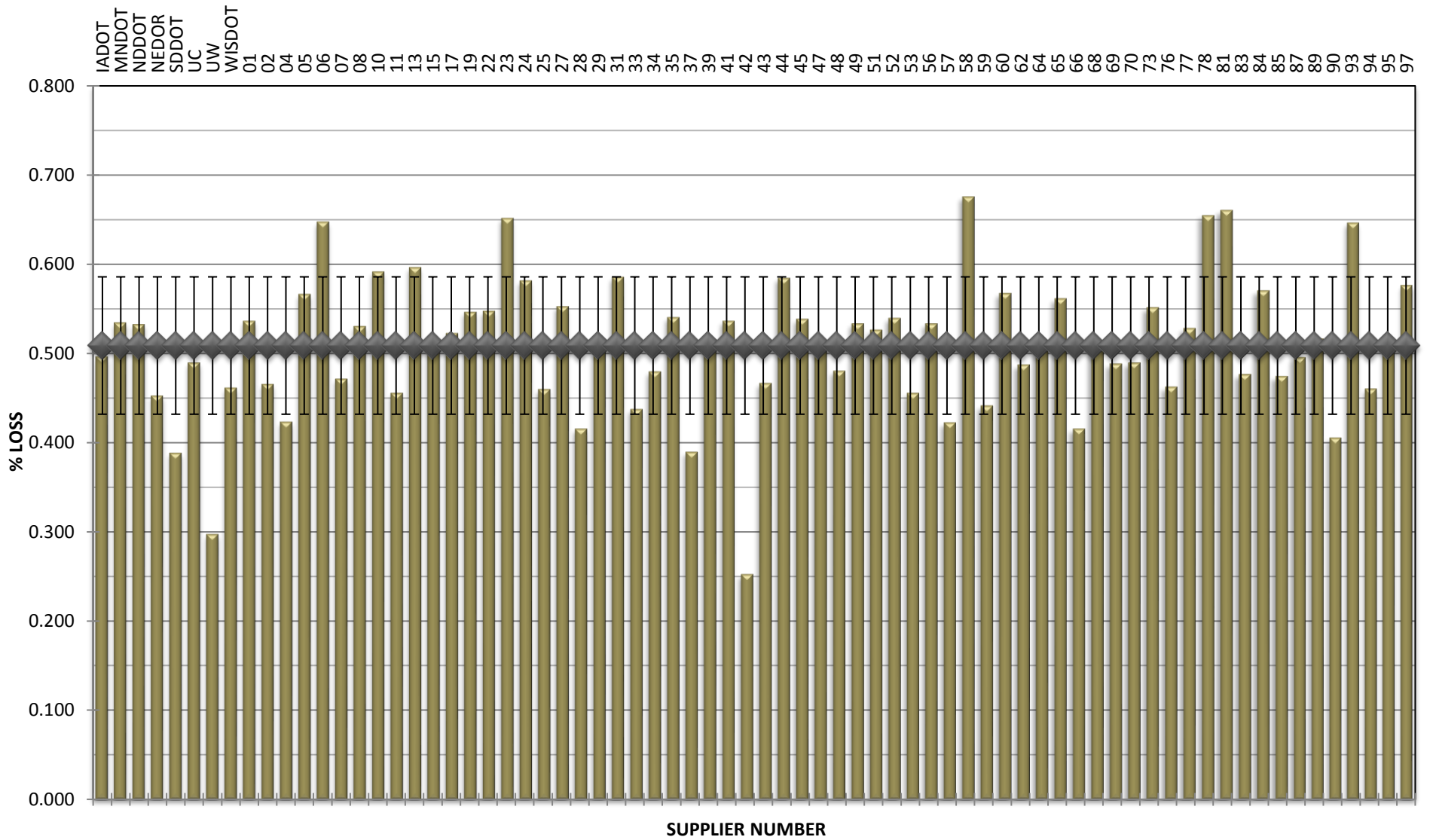
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SUMMARY A 2016-2
PG 58S-28**

DSR - PAV



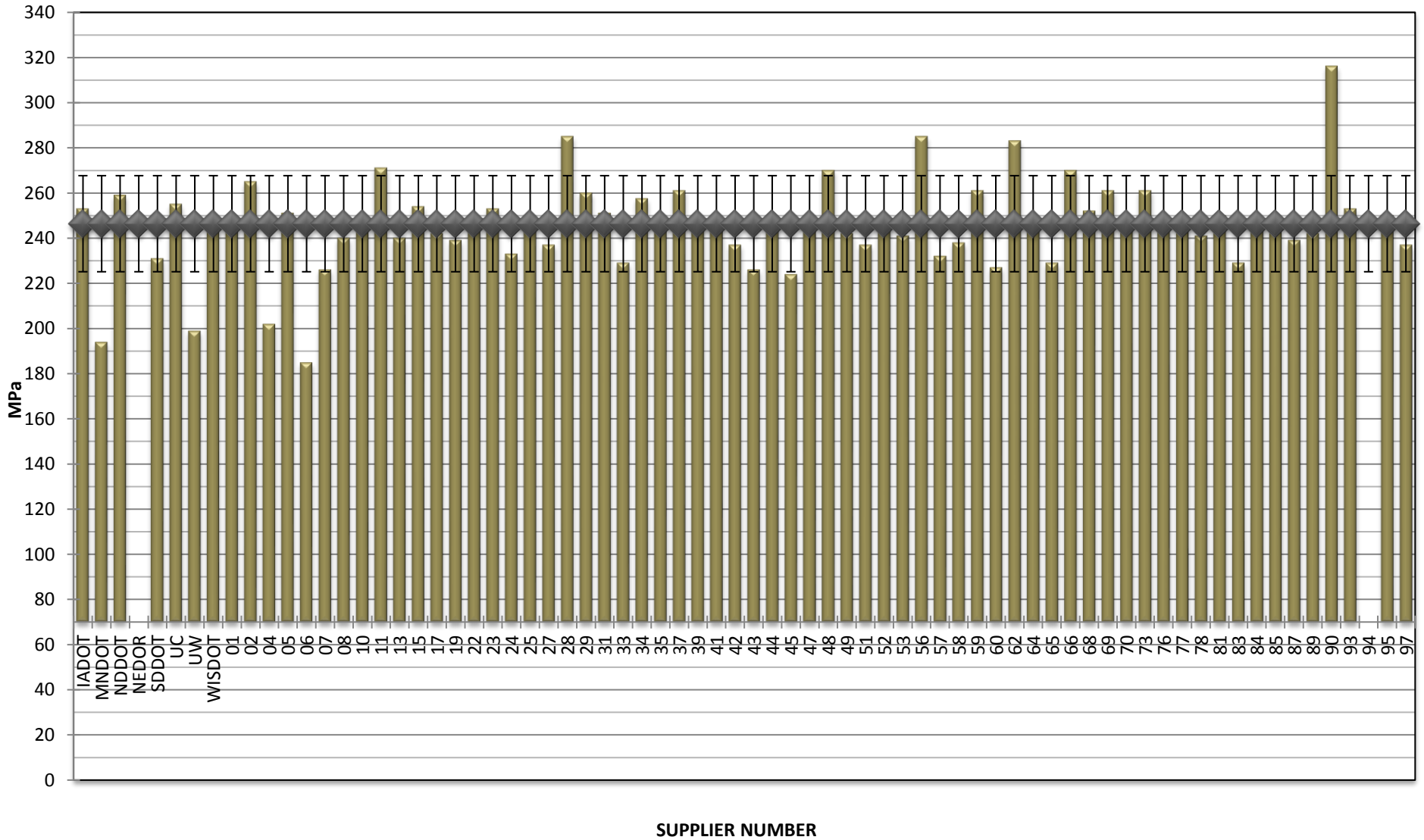
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SUMMARY A 2016-2
PG 58S-28**

RTFO MASS LOSS



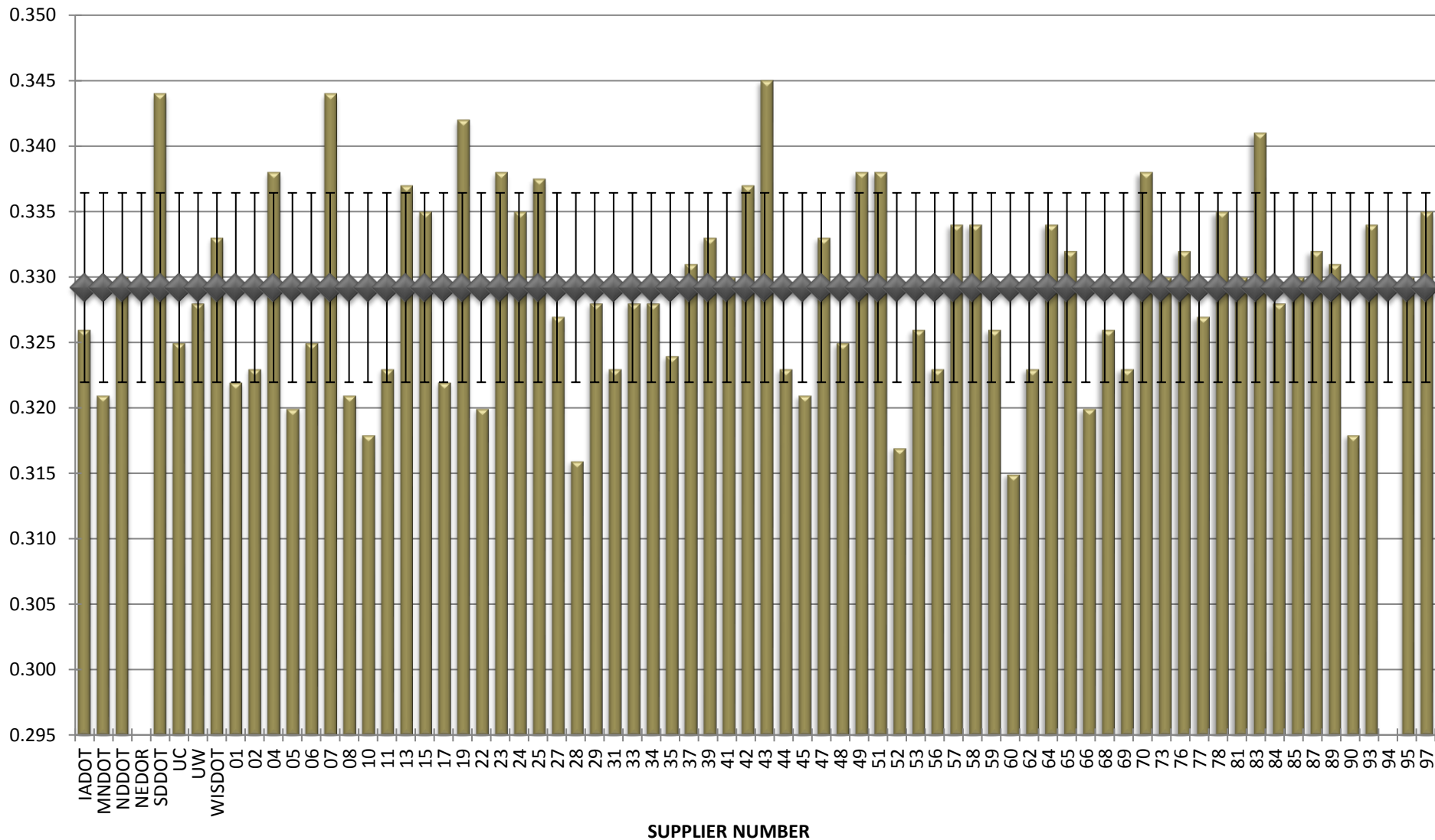
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SUMMARY A 2016-2
PG 58S-28**

BBR STIFFNESS



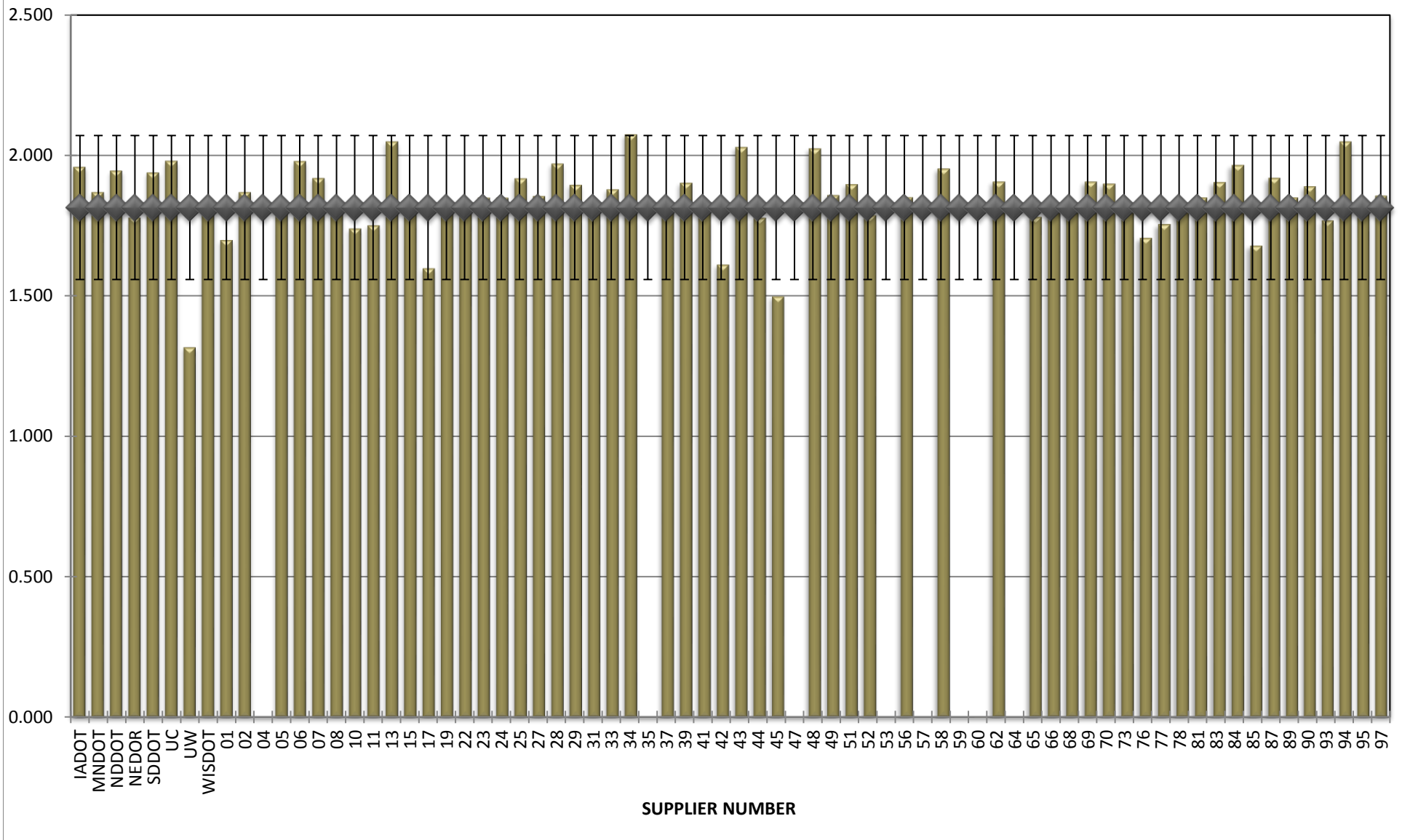
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SUMMARY A 2016-2
PG 58S-28**

BBR m-VALUE



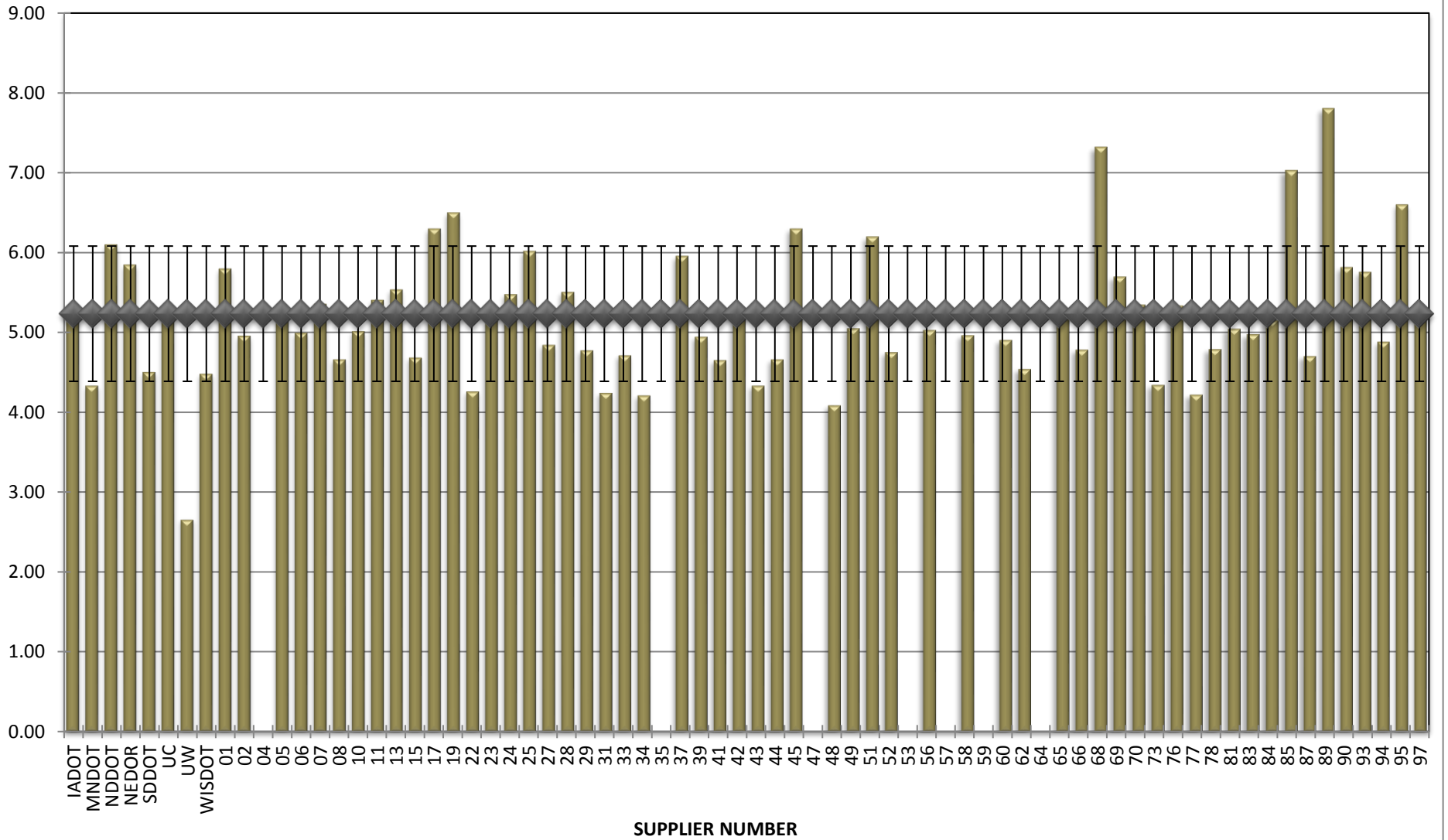
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2016-2
PG 58S-28**

Jnr @ 100 Pa



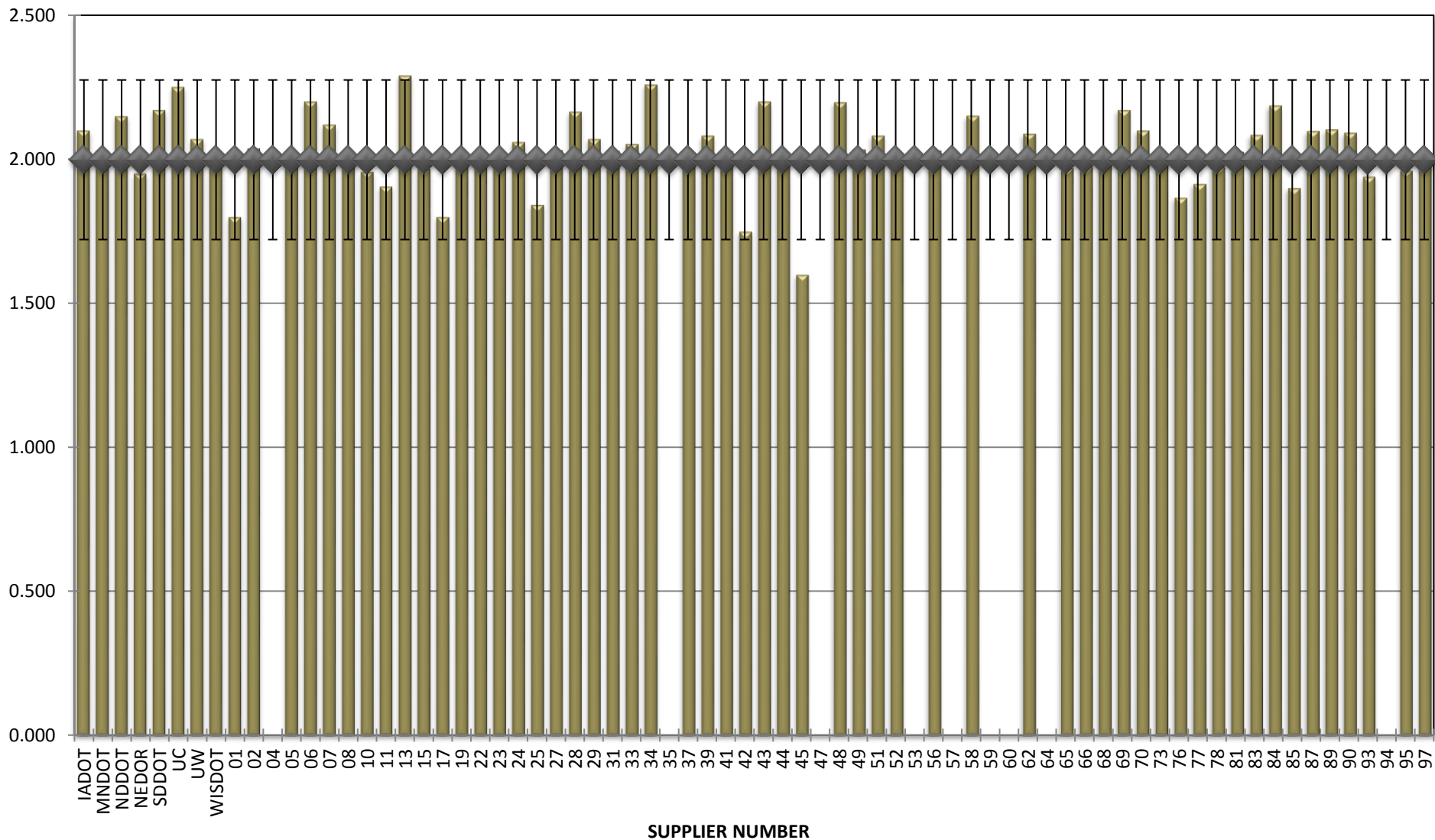
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SUMMARY A 2016-2
PG 58S-28**

% Recovery @ 100 Pa



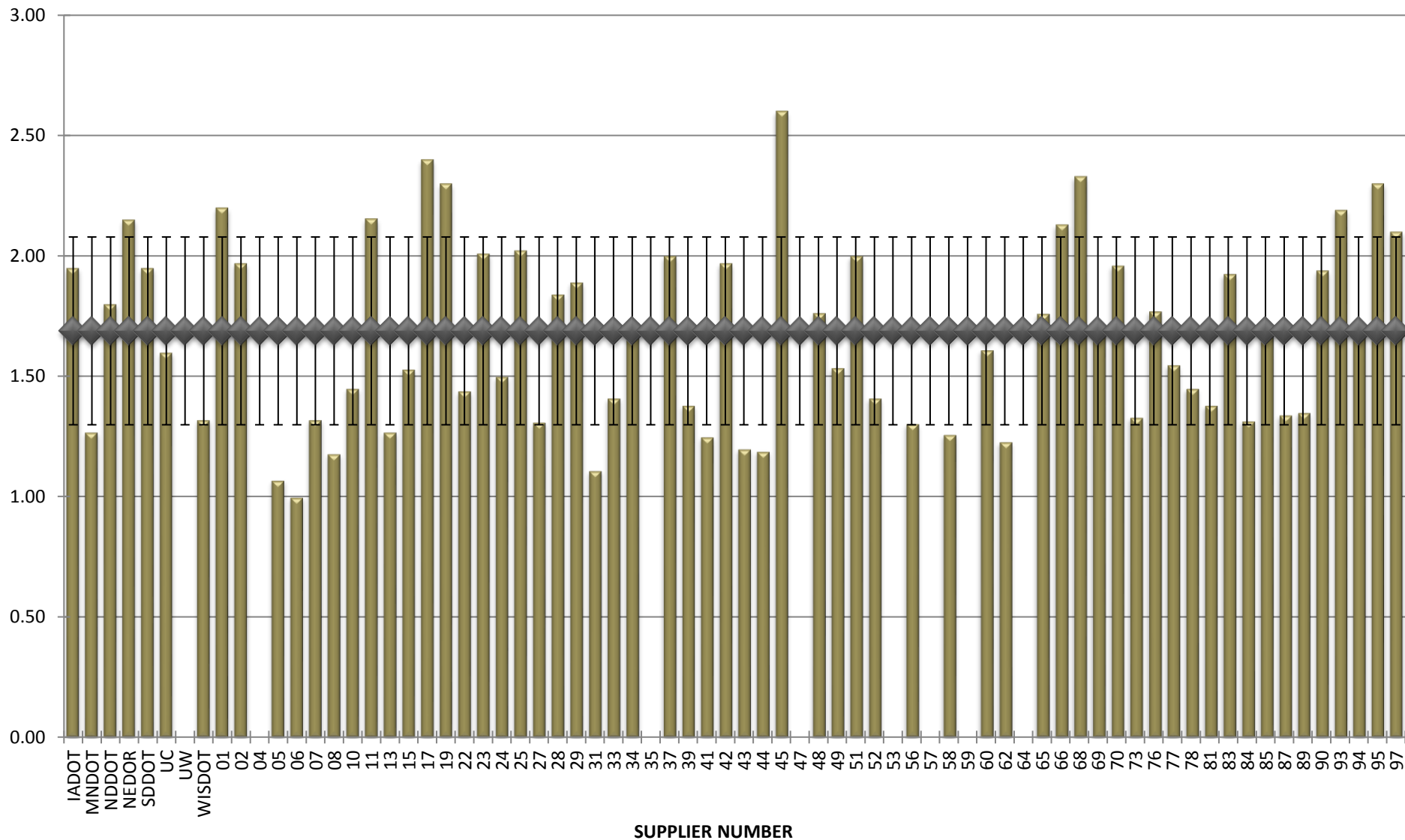
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2016-2
PG 58S-28**

Jnr @ 3200 Pa



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SUMMARY A 2016-2
PG 58S-28**

% Recovery @ 3200 Pa



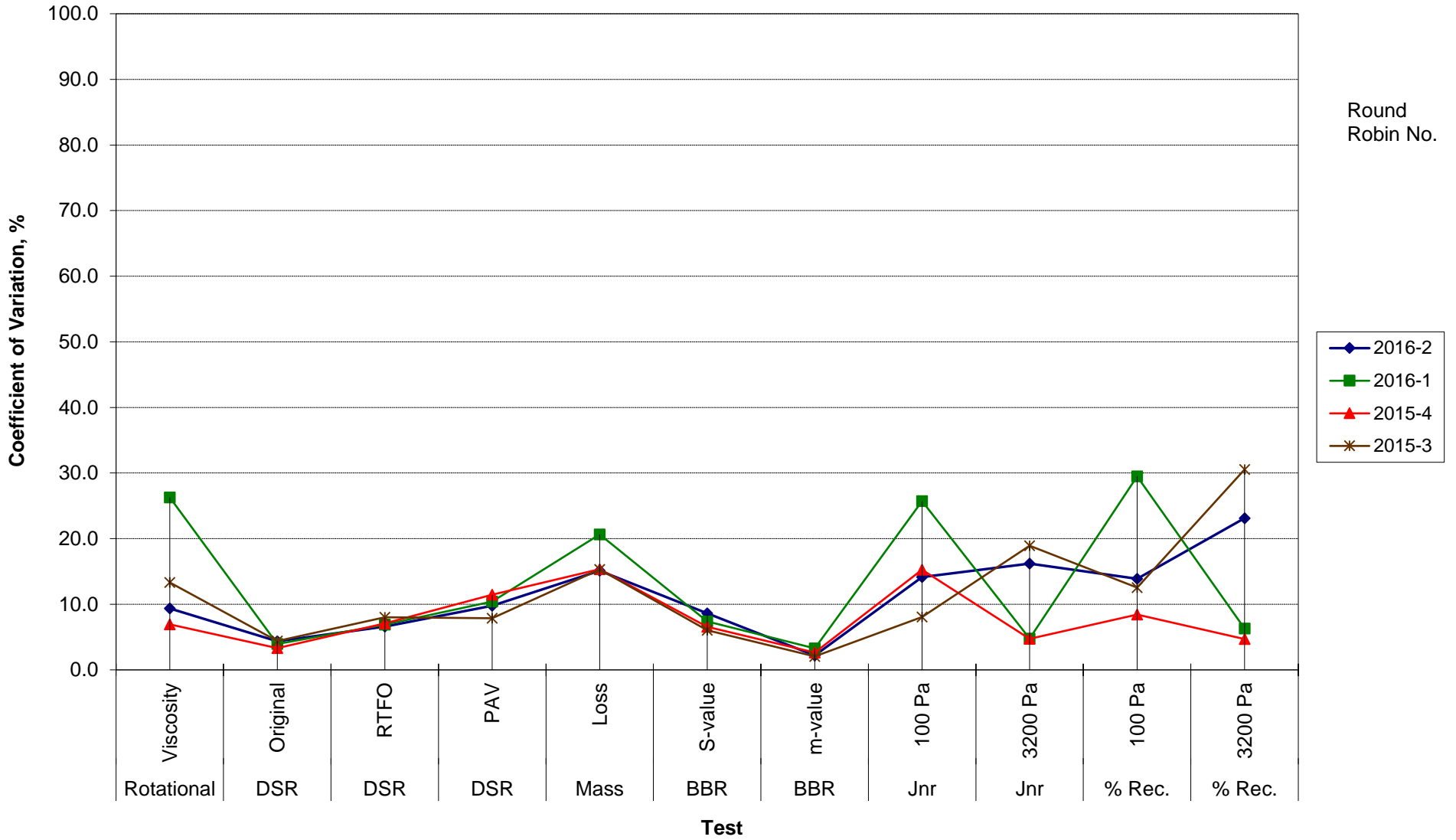
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

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
2016-2	74	9.354	4.354	6.608	9.769	15.132	8.634	2.198	14.135	16.185	13.869	23.119	70.706
2016-1	62	26.266	3.967	6.913	10.424	20.651	7.371	3.280	25.738	4.753	29.486	6.310	21.628
2015-4	72	6.934	3.312	7.074	11.465	15.350	6.550	2.640	15.255	4.719	8.413	4.678	73.562
2015-3	69	13.336	4.415	8.017	7.886	15.285	6.039	2.054	8.054	18.907	12.535	30.539	50.366

**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	0.350	1.87	4.64	4,471	0.509	244	0.329	1.842	5.23	2.029	1.69
Std. Dev.	0.0544	0.0851	0.3130	669.73	0.0741	45.51	0.0569	0.6077	1.7503	0.6858	0.6419
Coef. of Var.	15.523	4.546	6.739	14.979	14.572	18.615	17.298	32.989	33.439	33.806	38.020

**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