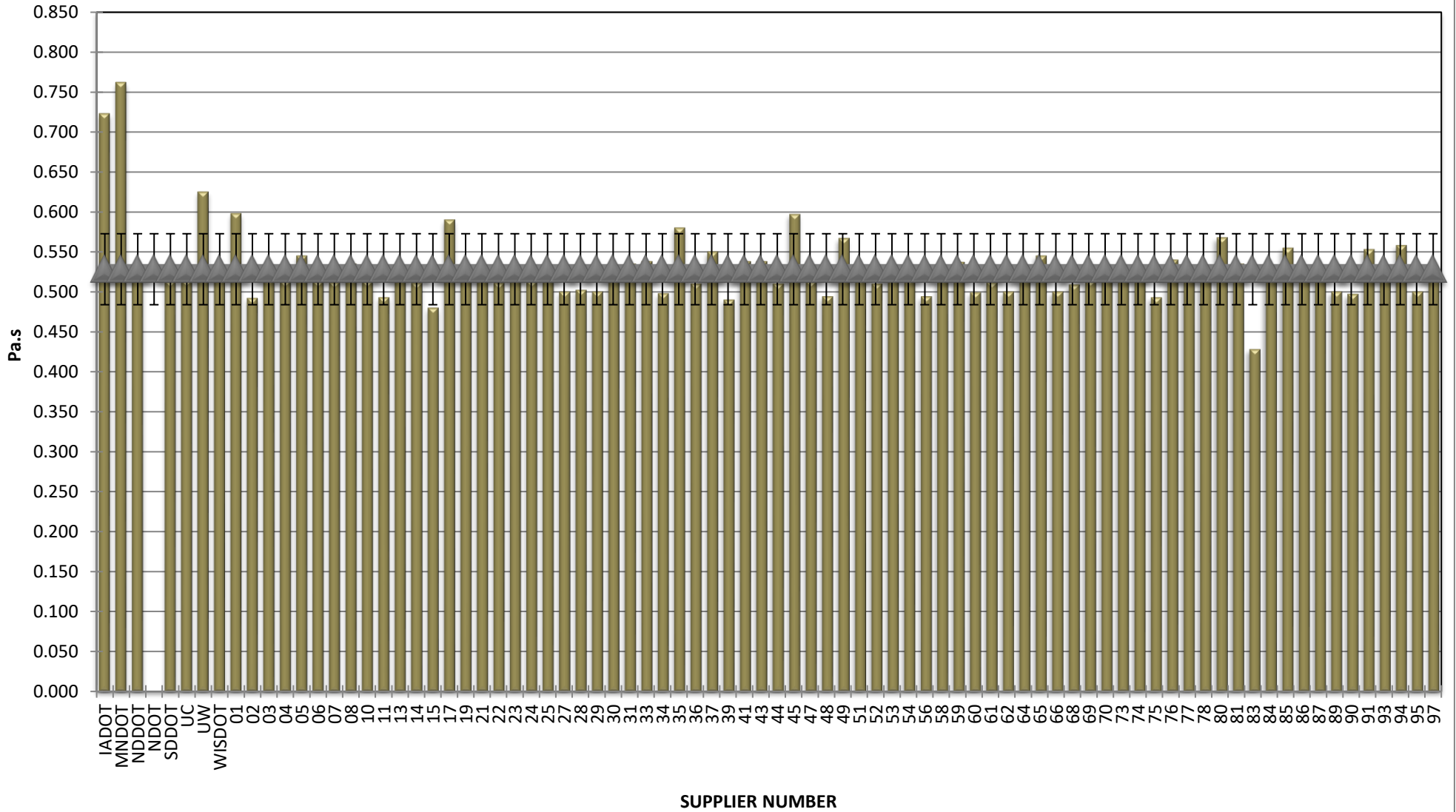


**COMBINED STATE BINDER GROUP ROUND ROBIN SUMMARY A 2021-3
PG 58H-28**

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	0.723	3.17		3,830	0.723	230	0.303	0.308	60.10	0.418	48.10
MNDOT	0.762	3.05		4,875	0.701	224	0.306	0.293	61.16	0.401	50.19
NDDOT	0.520	3.05		5,074	0.749	234	0.308	0.321	61.01	0.449	49.19
NDOT		3.02		4,502	0.609	222	0.304	0.352	58.20	0.503	45.10
SDDOT	0.513	3.01		4,440	0.550	209	0.316	0.324	60.92	0.519	43.16
UC	0.514	2.91		4,987	0.631	244	0.302	0.313	63.20	0.331	63.80
UW	0.625	2.64		2,172	2.654	208	0.287	0.293	63.32	0.470	46.71
WISDOT	0.533	3.05		3,870	0.675	239	0.293	0.302	61.31	0.422	49.40
01	0.598	3.45		4,830	0.685	214	0.304	0.263	61.42	0.346	52.12
02	0.492	3.06		4,996	0.743	209	0.295	0.317	60.90	0.449	48.50
03	0.516	3.03		4,383	0.756	223	0.307	0.328	59.00	0.453	47.00
04	0.513	2.97		3,210	0.700	251	0.298	0.385	54.42	0.486	46.26
05	0.545	3.04		4,690	0.845	238	0.295	0.286	61.46	0.399	49.58
06	0.513	3.04		4,290	0.852	210	0.316	0.328	60.45	0.457	48.54
07	0.512	3.01		4,521	0.789	233	0.307	0.274	63.70	0.420	49.20
08	0.535	2.84		4,870	0.736	231	0.299	0.310	61.04	0.441	48.31
10	0.513	3.19		4,864	0.753	219	0.309	0.258	62.95	0.385	49.88
11	0.493	3.04		4,918	0.717	211	0.299	0.339	60.38	0.493	46.64
13	0.524	2.94		4,440	0.736	222	0.318	0.299	61.45	0.407	50.77
14	0.511	3.06		4,342	0.756	226	0.310	0.268	63.45	0.414	49.33
15	0.480	2.96		4,444	0.667	222	0.310	0.310	61.00	0.459	47.90
17	0.590	3.41		4,940	0.684	224	0.302	0.283	61.09	0.394	49.48
19	0.519	3.01		4,556	0.749	231	0.303	0.315	59.90	0.434	48.20
21	0.518	3.11		4,528	0.787	235	0.325	0.271	61.78	0.361	52.18
22	0.511	3.10		4,398	0.762	225	0.306	0.267	62.46	0.392	49.71
23	0.528	2.93		4,535	0.770	232	0.323	0.279	64.30	0.390	53.19
24	0.513	2.88		4,350	0.727	222	0.319	0.304	62.95	0.462	48.58
25	0.517	3.04		4,473	0.666	218	0.315	0.332	58.75	0.469	45.59
27	0.500	3.07		5,325	0.723	230	0.309	0.305	58.37	0.473	41.39
28	0.502	3.18		4,570	0.787	236	0.304	0.281	61.33	0.381	50.88
29	0.500	2.99		4,047	0.705	220	0.297	0.307	59.22	0.431	46.58
30	0.525	3.19		4,240	0.610	233	0.309	0.300	60.56	0.418	48.56
31	0.535	2.93		4,960	0.776	221	0.294	0.272	61.86	0.380	50.15
33	0.538	3.01		4,715	0.596	225	0.305	0.321	60.22	0.451	47.79
34	0.498	3.13		4,565	0.711	214	0.306	0.337	59.91	0.486	46.36
35	0.580	3.18		4,600	0.659	224	0.308	0.252	65.82	0.346	55.76
36	0.510	2.84		4,651	0.784	228	0.305	0.282	62.51	0.429	48.55
37	0.550	3.03		5,140	0.812	235	0.303	0.290	63.33	0.400	52.77
39	0.490	2.96		4,330	0.680	227	0.310	0.326	59.40	0.466	47.70
41	0.538	2.96		4,710	0.811	235	0.297	0.308	60.29	0.424	48.76
43	0.538	2.90		4,600	0.692	241	0.302	0.410	53.70	0.528	44.60
44	0.510	2.93		4,472	0.737	223	0.306	0.267	63.13	0.390	50.98
45	0.597	3.53		4,690	0.699	206	0.300	0.285	61.14	0.394	49.68
47	0.513	2.97		3,210	0.700	251	0.298	0.385	54.42	0.486	46.26
48	0.494	3.02		4,753	0.709	231	0.296	0.333	61.60	0.488	47.69
49	0.567	3.35		4,494	0.649	214	0.307	0.264	64.85	0.360	53.77
51	0.517	2.98		4,667	0.760	227	0.303	0.315	59.80	0.435	48.10
52	0.510	3.15		4,613	0.789	223	0.304	0.272	63.05	0.395	50.92
53	0.523	2.97		4,290	0.670	227	0.310	0.340	59.94	0.482	47.20
54	0.517	2.98		4,344	0.735	233	0.300	0.292	62.30	0.398	51.70
56	0.494	2.99		5,151	0.683	233	0.297	0.358	59.91	0.506	47.06
58	0.531	3.00		4,600	0.833	240	0.305	0.339	58.42	0.476	45.68
59	0.537	3.17		4,977	0.812	219	0.317	0.254	61.30	0.291	58.10
60	0.499	3.14		5,480	0.700	215	0.297	0.348	58.10	0.496	44.72
61	0.512	2.98		4,538	0.747	221	0.310	0.267	63.34	0.409	49.69
62	0.500	2.87		4,840	0.730	229	0.302	0.330	59.83	0.482	45.78
64	0.528	2.99		4,612	0.768	223	0.303	0.330	60.10	0.467	47.30
65	0.545	3.05		4,980	0.803	199	0.296	0.279	61.29	0.388	49.48
66	0.500	2.97		5,061	0.688	233	0.302	0.319	59.32	0.439	47.62
68	0.509	2.94		3,565	0.811	242	0.310	0.327	57.52	0.391	51.25
69	0.514	3.00		4,789	0.636	244	0.302	0.299	63.00	0.312	64.00
70	0.532	3.03		4,350	0.592	250	0.301	0.263	67.25	0.376	56.21
73	0.528	2.95		4,191	0.793	222	0.322	0.242	65.90	0.324	57.10
74	0.521	3.06		4,335	0.706	212	0.320	0.308	59.52	0.425	47.93
75	0.493	3.01		4,860	0.716	231	0.299	0.275	61.89	0.400	49.58
76	0.540	2.96		3,519	0.650	226	0.321	0.291	59.84	0.403	47.87
77	0.530	2.88		5,434	0.575	232	0.302	0.302	57.40	0.415	45.23
78	0.528	2.94		4,460	0.862	236	0.302	0.344	58.74	0.488	45.58
80	0.568	3.00		2,836	0.620	190	0.327	0.248	71.70	0.392	58.63
81	0.535	3.06		4,880	0.817	239	0.303	0.317	58.90	0.442	46.65
83	0.428	3.03		4,780	0.727	227	0.299	0.250	64.48	0.337	55.10
84	0.524	2.93		4,720	0.767	222	0.312	0.364	58.39	0.516	44.95
85	0.555	3.26		4,760	0.825	233	0.302	0.289	61.76	0.397	50.66
86	0.532	3.01			0.527			0.323	61.23	0.449	49.62
87	0.520	2.97		4,140	0.748	222	0.295	0.308	61.42	0.429	49.78
89	0.500	2.97		3,898	0.684	229	0.312	0.314	61.00	0.465	48.00
90	0.497	3.01		5,117	0.689	237	0.298	0.307	60.46	0.429	48.41
91	0.553	3.04		1,480	0.751	218	0.309	0.362	59.97	0.521	46.65
93	0.523	2.94		4,330	0.837	230	0.321	0.344	65.51	0.561	53.40
94	0.558	2.96		4,370	0.803	227	0.303	0.290	61.89	0.403	50.84
95	0.500	3.06		4,801	0.771	223	0.312	0.286	62.20	0.429	48.20
97	0.518	3.00		4,591	0.757	222	0.306	0.332	59.20	0.457	47.30
99	0.495	3.04		5,500	0.736	233	0.301	0.307	60.65	0.434	48.30
Average	0.528	3.03		4,491	0.749	226	0.306	0.306	61.09	0.429	49.39
Std. Dev.	0.044	0.13		638	0.223	11	0.008	0.034	2.65	0.053	3.90
Coef. of Var.	8.405	4.30		14	29.797	5	2.633	10.956	4.33	12.259	7.89

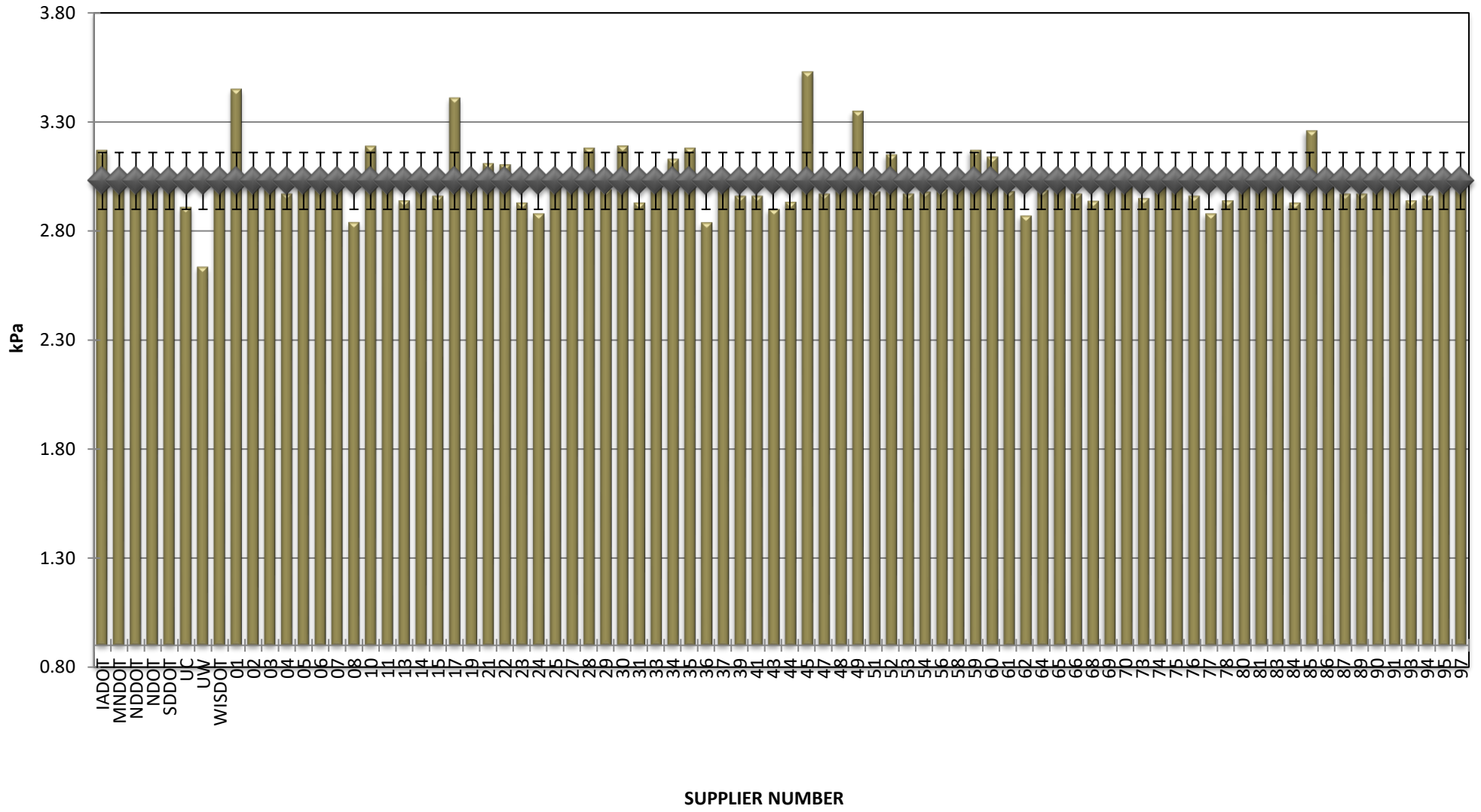
**COMBINED STATE BINDER GROUP ROUND ROBIN
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ROTATIONAL VISCOSITY



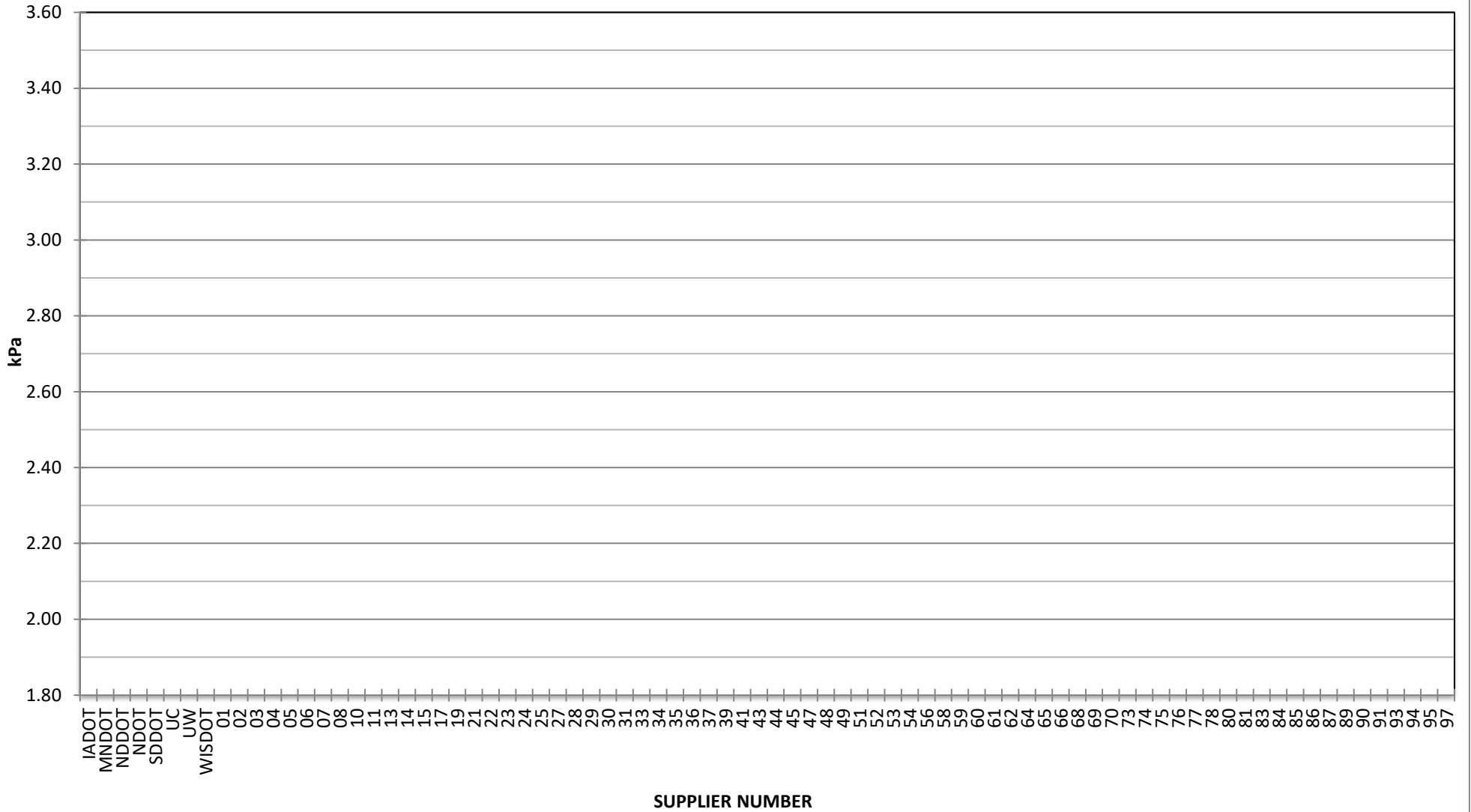
**COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - ORIGINAL



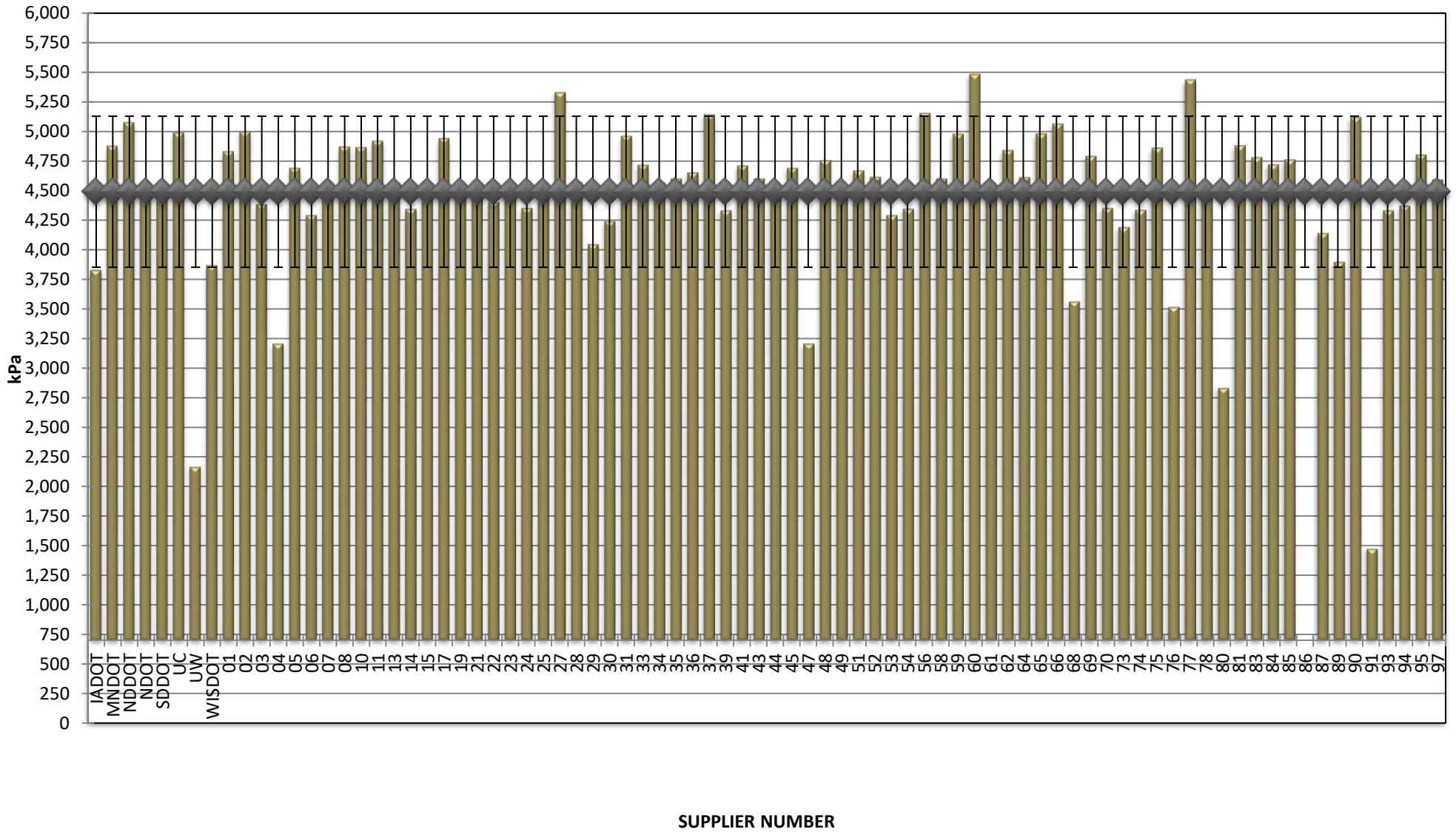
COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - RTFO



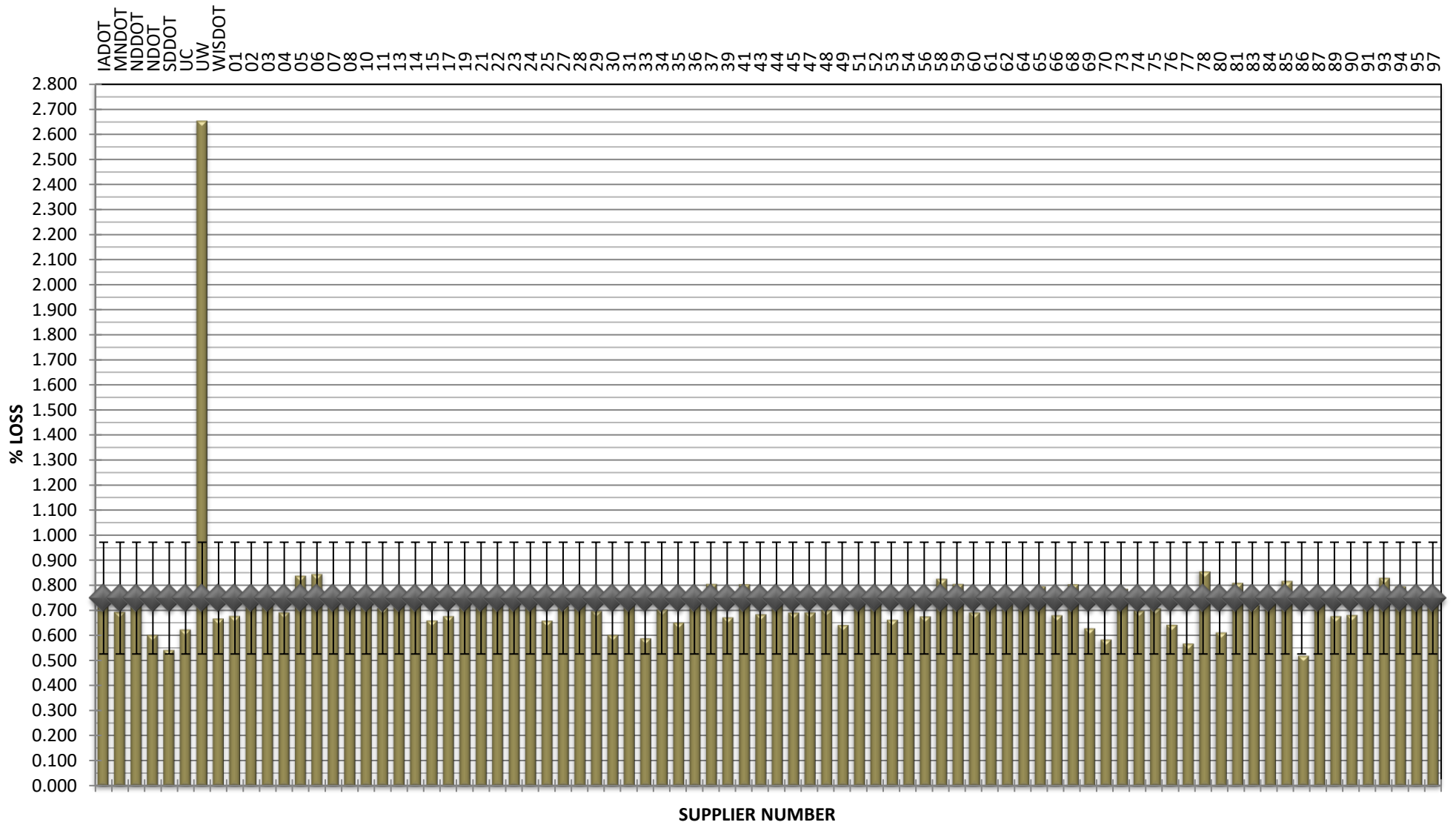
**COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - PAV



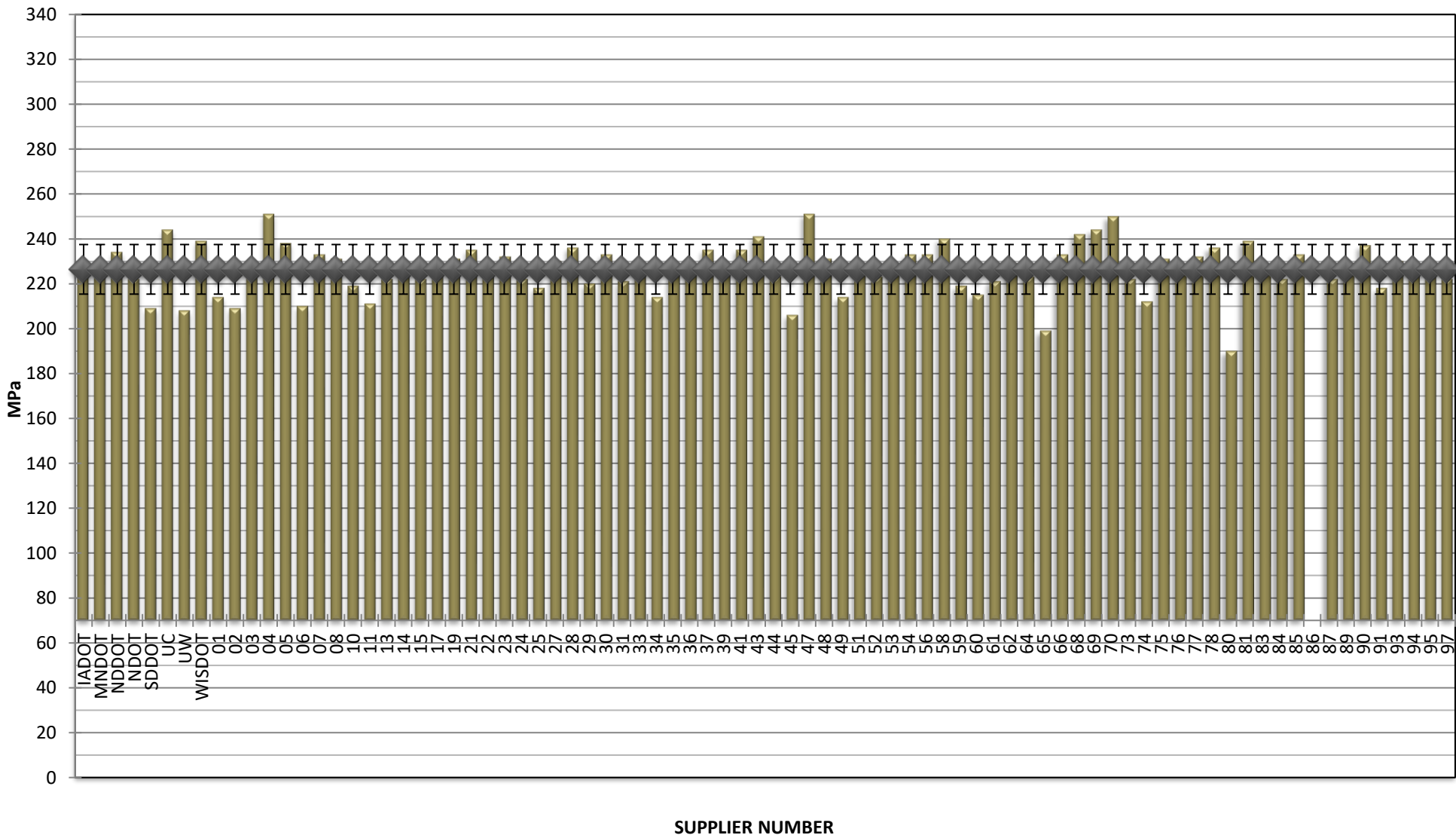
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RTFO MASS LOSS



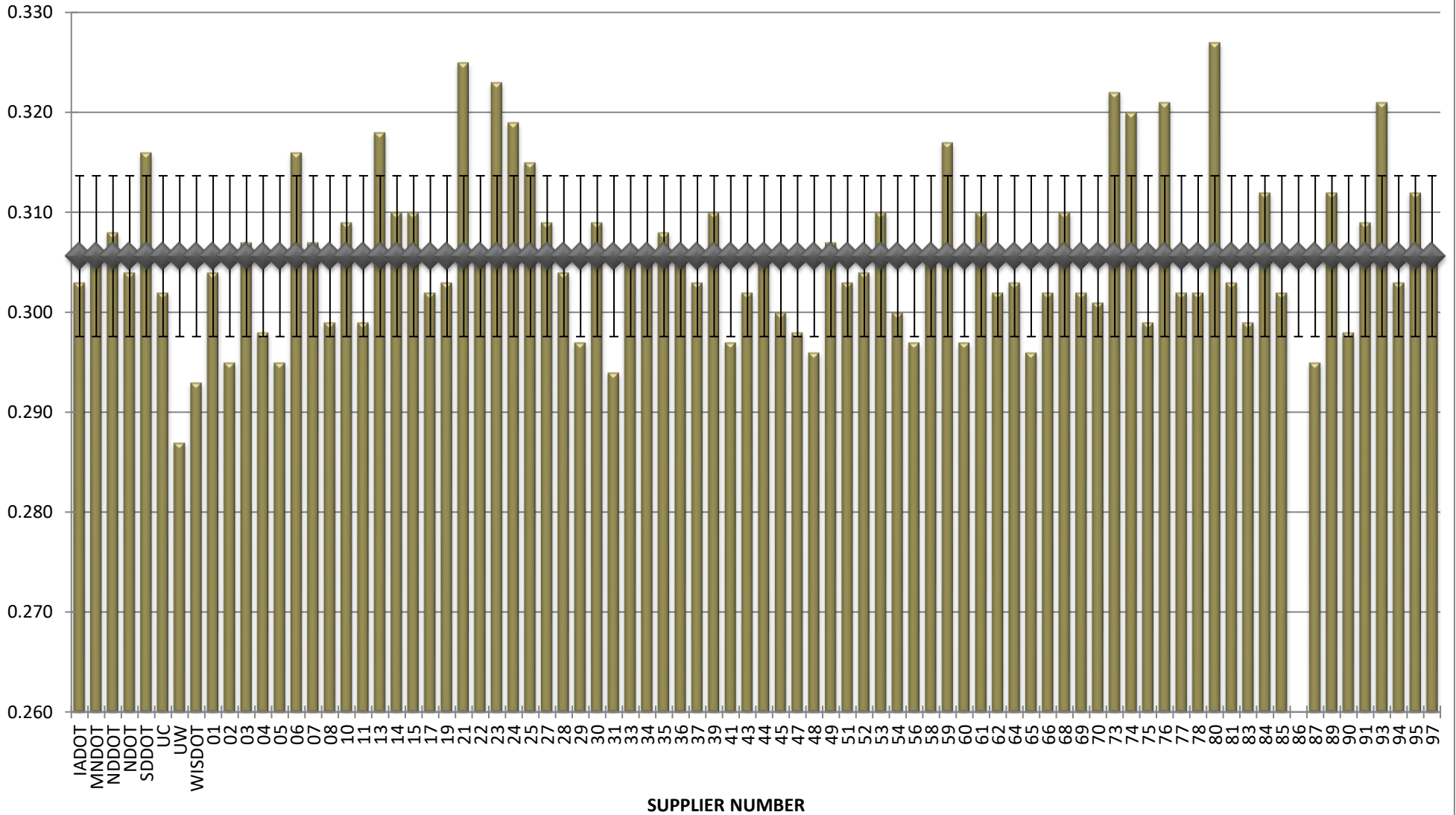
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BBR STIFFNESS



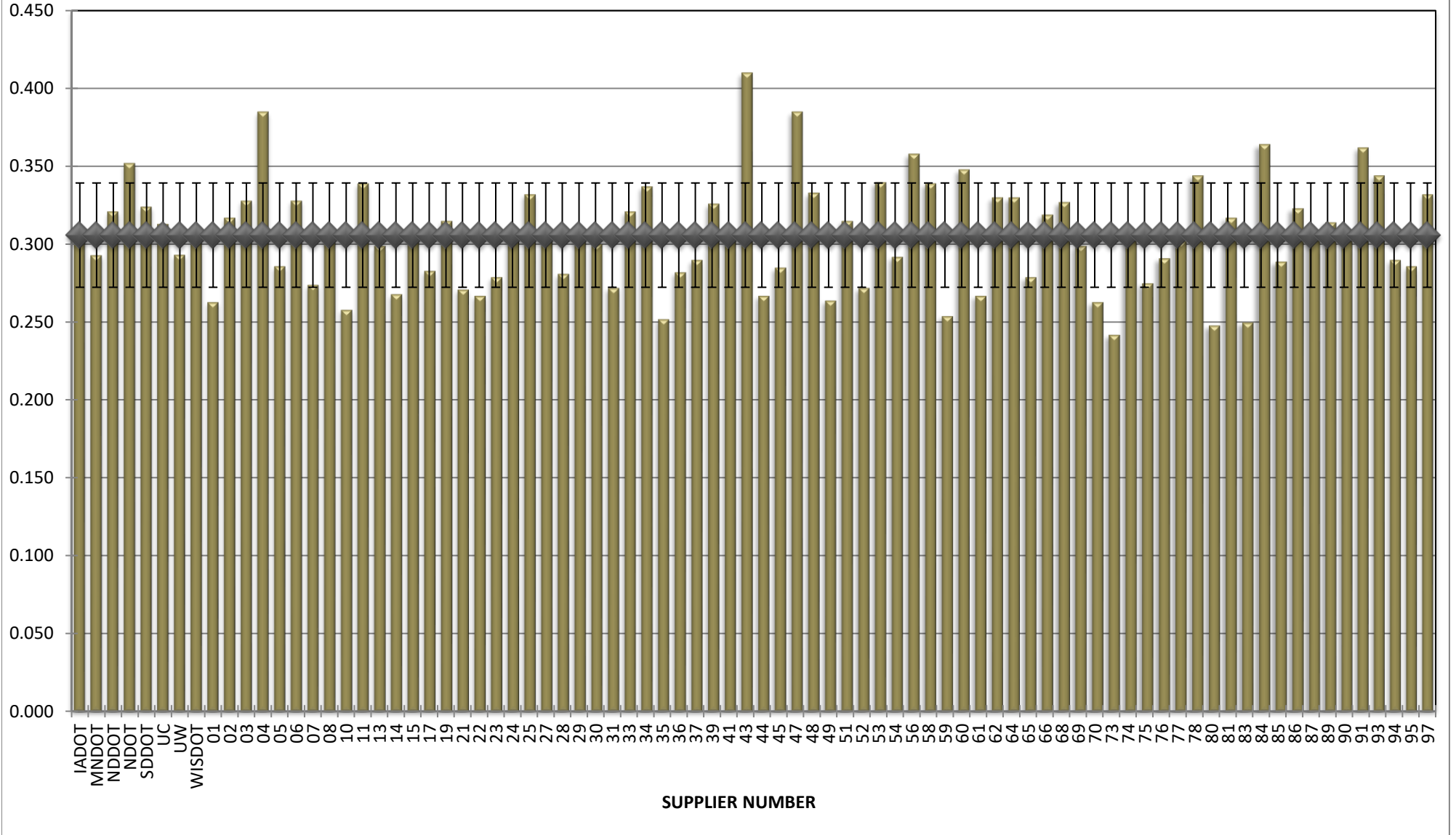
**COMBINED STATE BINDER GROUP ROUND ROBIN
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BBR m-VALUE



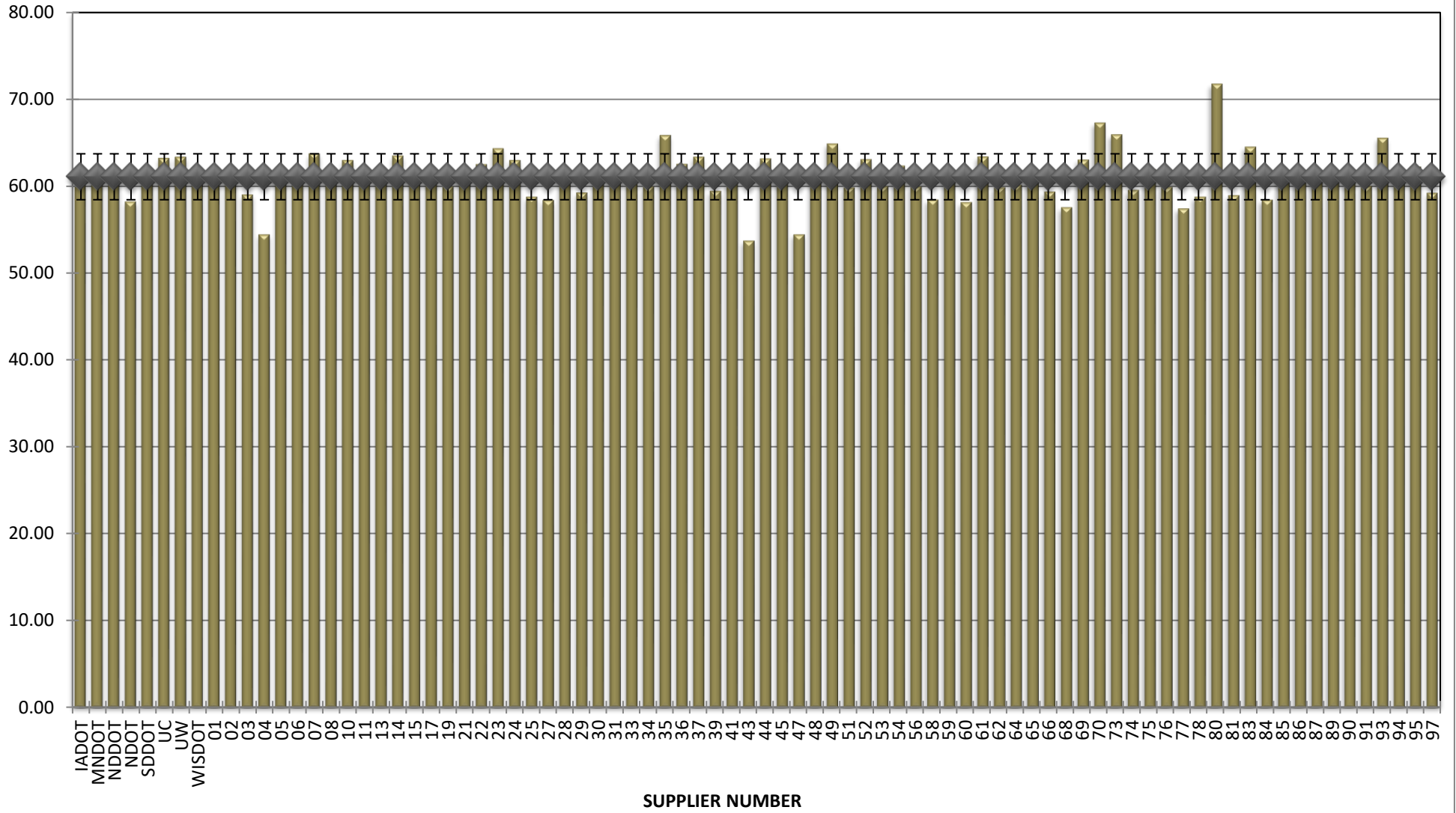
**COMBINED STATE BINDER GROUP ROUND ROBIN
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Jnr @ 100 Pa



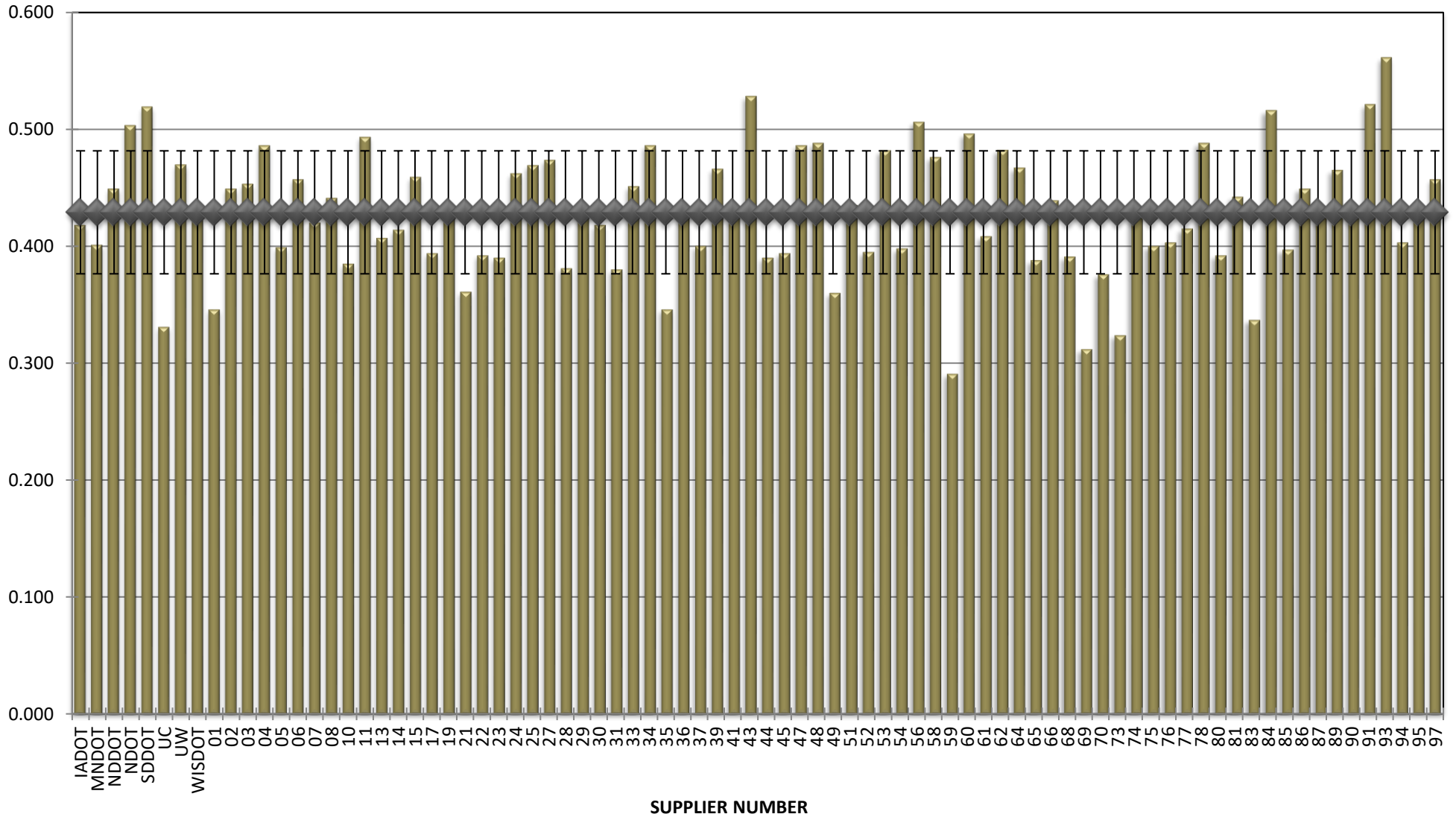
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2021-3
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% Recovery @ 100 Pa



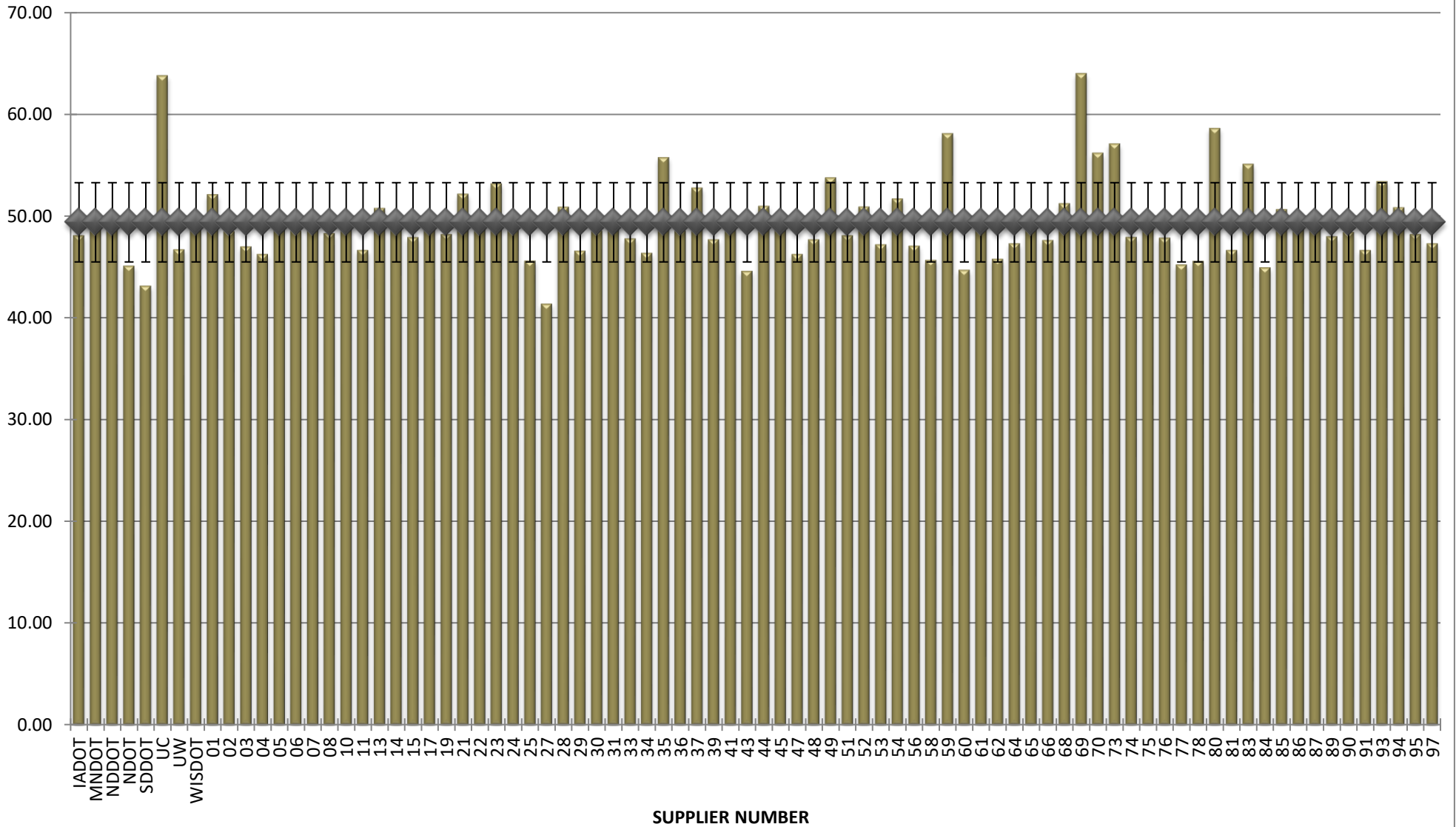
**COMBINED STATE BINDER GROUP ROUND ROBIN
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PG 58H-28**

Jnr @ 3200 Pa



**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2021-3
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% Recovery @ 3200 Pa



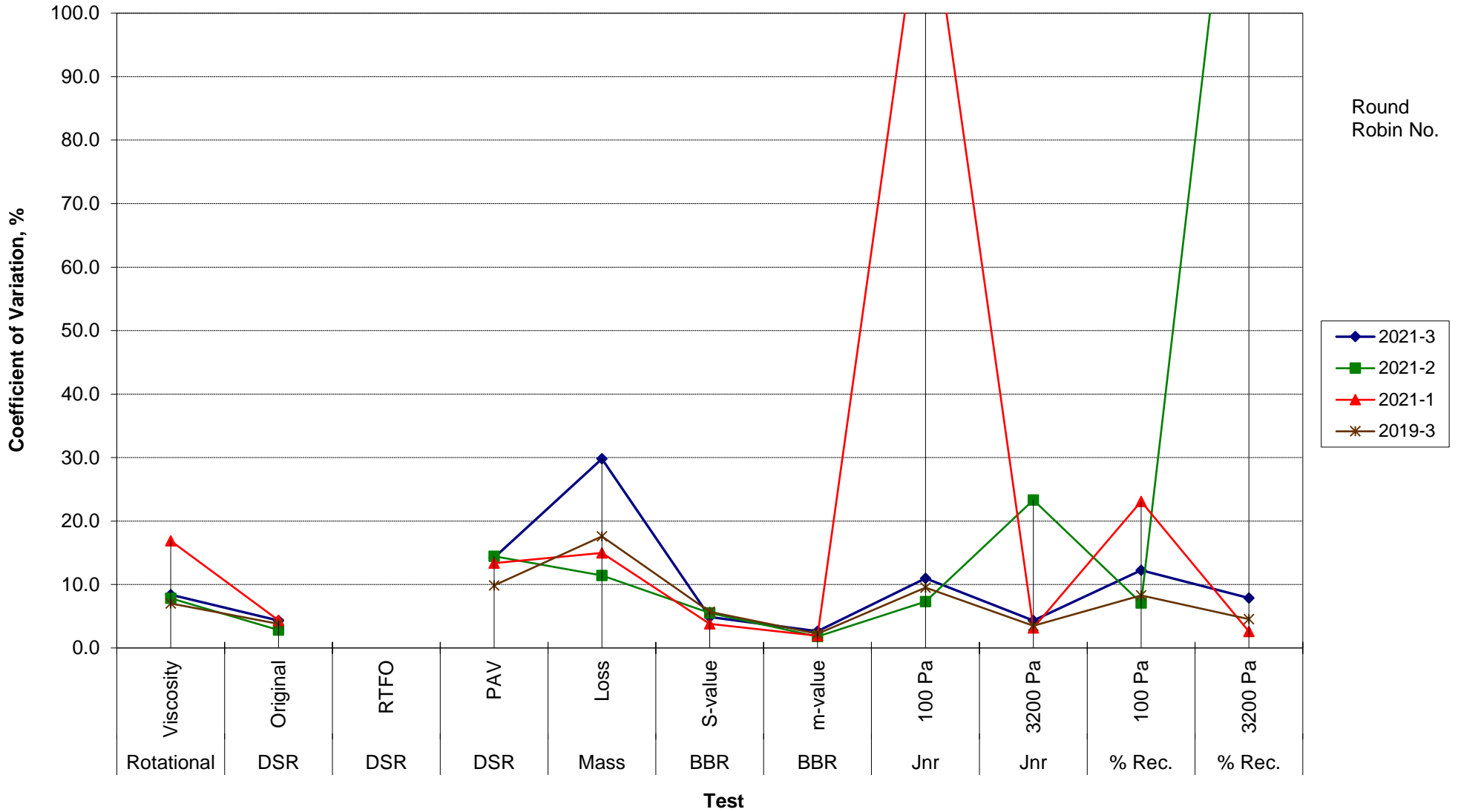
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

COEFFICIENT OF VARIATION

R R No.	Number of Participants	Performance Grade	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
2021-3	83	58H-28	8.405	4.300		14.217	29.797	4.880	2.633	10.956	4.331	12.259	7.888	23.053
2021-2	78	58-28S	7.842	2.838		14.457	11.431	5.502	1.802	7.294	23.319	7.098	152.558	74.259
2021-1	72	58-34E	16.870	4.360		13.354	14.981	3.785	1.923	123.328	3.154	23.097	2.608	29.516
2019-3	66	58-28H	7.028	3.779		9.848	17.580	5.691	2.231	9.519	3.499	8.284	4.540	33.516

**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	0.523	3.02		4,558	0.749	227	0.306	0.305	60.96	0.429	49.03
Std. Dev.	0.0287	0.1016		471.28	0.0711	10.38	0.0081	0.0318	2.3973	0.0529	3.2075
Coef. of Var.	5.487	3.361		10.340	9.500	4.574	2.644	10.452	3.933	12.334	6.542

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

COEFFICIENT OF VARIATION

R R No.	Number of Participants	Performance Grade	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	64-34	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	64-22	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	58-34	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	64-28	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	58-28S	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	58-34E	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	70-28P	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	64-22	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	58-34H	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	58-28S	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	58-34V	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	64S-22	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	58-28S	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	58-34E	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	58-28S	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	52-34S	13.2579	4.7082		11.84	13.212726	5.854851	3.05673	53.74261	22.0569	8.043793	50.80675	20.07887
2019-3	66	58-28H	7.0285	3.7792		9.8478	17.580086	5.690624	2.23106	9.518568	3.498796	8.283841	4.539972	33.51614
2021-1	72	58-34E	16.8701	4.3597		13.354	14.980827	3.784658	1.923067	123.3285	3.154241	23.09658	2.608384	29.51648
2021-2	78	58-28S	7.84153	2.8382		14.457	11.431002	5.502305	1.802378	7.294076	23.31866	7.097866	152.5584	74.25903
2021-3	83	58H-28	8.40496	4.3004		14.217	29.797157	4.879639	2.6327	10.95622	4.330614	12.25935	7.888472	23.05315

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