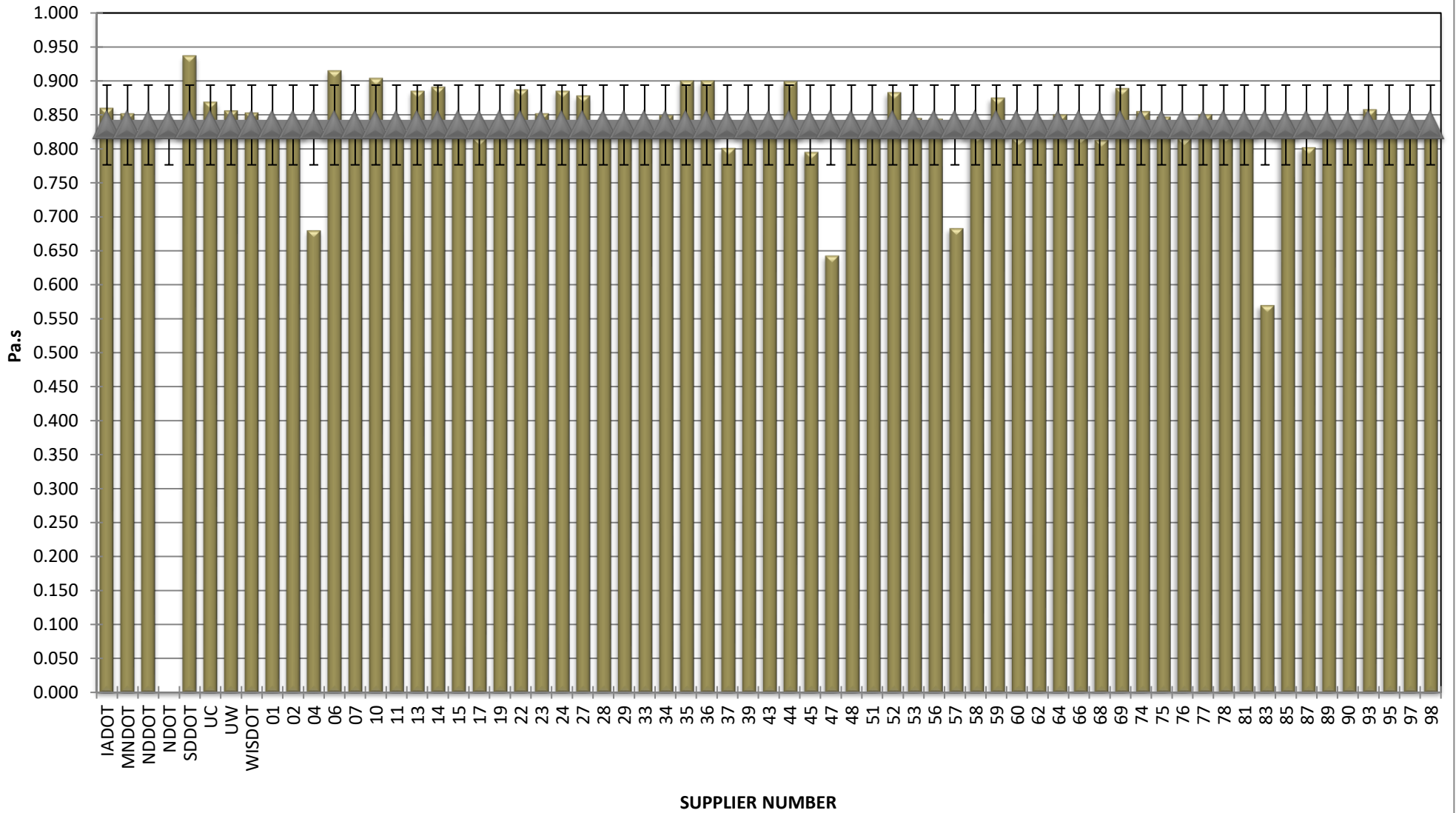


**COMBINED STATE BINDER GROUP ROUND ROBIN SUMMARY A 2019-3
PG 58H-28**

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	0.860	3.25		3,670	0.415	207	0.332	0.387	61.79	0.527	50.30
MNDOT	0.852	3.13		3,530	0.244	201	0.340	0.356	63.52	0.484	52.71
NDDOT	0.835	3.47		4,129	0.475	193	0.338	0.446	57.00	0.497	53.90
NDOT		3.18		2,350	0.329	162	0.349	0.338	63.30	0.561	51.10
SDDOT	0.937	2.84		2,960	0.370	162	0.356	0.422	60.50	0.622	45.17
UC	0.869	3.08		3,657	0.421	205	0.340	0.422	61.10	0.472	59.10
UW	0.856	3.17		3,357	0.540	172	0.362	0.357	63.43	0.462	54.59
WISDOT	0.853	3.01		3,280	0.381	200	0.336	0.384	63.31	0.528	52.01
01	0.822	3.11		3,570	0.434	188	0.343	0.416	60.55	0.569	48.77
02	0.832	3.33		4,200	0.463	199	0.327	0.365	63.23	0.495	52.27
04	0.680	3.20		3,156	0.403	213	0.330	0.327	65.40	0.469	54.50
06	0.915	3.20		3,190	0.528	195	0.347	0.397	63.56	0.541	52.66
07	0.832	2.93		3,676	0.462	194	0.355	0.363	63.80	0.521	51.60
10	0.904	3.04		3,557	0.520	203	0.334	0.362	63.66	0.554	49.60
11	0.833	3.36		4,138	0.473	197	0.334	0.357	63.29	0.486	52.18
13	0.885	3.10		3,490	0.571	185	0.328	0.373	59.67	0.500	48.81
14	0.891	3.02		3,265	0.443	190	0.339	0.376	62.49	0.553	49.35
15	0.840	3.02		3,320	0.425	172	0.350	0.438	60.33	0.597	48.68
17	0.815	3.14		3,880	0.446	198	0.336	0.363	62.62	0.501	51.08
19	0.822	3.15		3,569	0.413	192	0.337	0.391	62.40	0.533	51.00
22	0.887	3.01		3,445	0.502	198	0.341	0.379	62.42	0.561	49.14
23	0.852	3.23		3,821	0.513	202	0.350	0.340	62.94	0.477	51.65
24	0.885	3.05		4,200	0.497	209	0.349	0.348	61.82	0.474	50.65
27	0.878	3.50		3,320	0.456	200	0.336	0.371	65.09	0.541	52.18
28	0.840	3.13		4,007	0.330	191	0.340	0.384	63.30	0.526	52.08
29	0.838	3.02		3,340	0.486	188	0.341	0.407	64.12	0.574	51.80
33	0.842	3.13		3,530	0.373	190	0.342	0.378	62.60	0.514	51.47
34	0.849	3.13		3,958	0.458	209	0.336	0.380	61.74	0.517	50.42
35	0.900	3.18		3,450	0.716	202	0.326				
36	0.900	3.01		3,571	0.512	201	0.338	0.382	62.38	0.556	49.50
37	0.801	3.15		3,670	0.346	191	0.342	0.400	62.30	0.540	50.80
39	0.837	3.03		3,420	0.431	173	0.347	0.427	60.61	0.593	48.06
43	0.823	3.10		3,520	0.413	205	0.348	0.518	55.90	0.604	50.69
44	0.899	3.00		3,352	0.449	200	0.339	0.371	63.15	0.548	49.87
45	0.795	3.06		4,060	0.412	190	0.339	0.377	61.63	0.517	50.52
47	0.643	3.19		3,354	0.288	202	0.330	0.339	65.10	0.497	53.10
48	0.840	3.22		3,810	0.446	210	0.331	0.327	64.30	0.456	52.34
51	0.827	3.16		3,802	0.453	190	0.338	0.391	61.30	0.531	49.70
52	0.883	3.02		3,454	0.531	195	0.342	0.382	62.53	0.556	49.79
53	0.845	3.05		3,402	0.377	202	0.341	0.389	63.35	0.591	47.91
56	0.844	3.21		3,650	0.472	203	0.333	0.381	63.25	0.512	50.85
57	0.683	3.28		3,175	0.258	196	0.343	0.345	67.30	0.502	56.10
58	0.820	3.14		3,790	0.437	202	0.348	0.394	62.09	0.548	49.68
59	0.875	3.22		2,748	0.456	197	0.339	0.380	56.40	0.450	50.60
60	0.815	3.26		3,910	0.506	186	0.333	0.368	63.86	0.499	52.99
62	0.835	3.22		3,263	0.412	183	0.343	0.360	62.52	0.489	51.51
64	0.850	3.08		3,513	0.325	204	0.344	0.398	62.41	0.605	46.49
66	0.818	3.16		3,655	0.342	185	0.332	0.390	62.82	0.544	50.70
68	0.813	2.87		3,692	0.440	190	0.343	0.483	55.07	0.549	50.79
69	0.889	3.03		3,812	0.373	205	0.343	0.441	59.20	0.508	55.90
74	0.855	3.13		3,775	0.462	188	0.352	0.370	62.53	0.522	49.47
75	0.847	3.10		3,992	0.479	205	0.324	0.398	62.49	0.538	51.58
76	0.815	3.02		3,498	0.409	203	0.343	0.452	61.44	0.618	49.97
77	0.850	3.07		4,310	0.491	189	0.342	0.362	64.16	0.488	53.59
78	0.820	3.18		4,085	0.496	204	0.343	0.382	61.73	0.522	50.04
81	0.835	3.12		4,140	0.471	200	0.342	0.357	62.57	0.489	51.14
83	0.570	3.06		4,180	0.523	197	0.342	0.324	65.16	0.420	56.79
85	0.825	2.96		3,653	0.405	206	0.345	0.432	61.58	0.590	50.16
87	0.802	3.12		3,760	0.480	196	0.346	0.328	63.40	0.459	51.59
89	0.840	3.03		3,420	0.422	170	0.350	0.422	61.08	0.569	50.07
90	0.822	3.19		3,940	0.345	182	0.334	0.369	63.03	0.499	52.25
93	0.858	3.21		3,676	0.556	201	0.352	0.351	62.96	0.493	51.43
95	0.836	3.16		3,559	0.401	191	0.352	0.363	64.10	0.548	50.60
97	0.828	3.20		3,787	0.416	183	0.341	0.372	61.80	0.507	50.20
98	0.824	3.11		3,883	0.440	191	0.342	0.385	61.30	0.524	49.60
99	0.820	3.21		3,425	0.349	202	0.332	0.358	66.37	0.498	55.39
Average	0.835	3.13		3,617	0.438	194	0.341	0.383	62.34	0.525	51.24
Std. Dev.	0.059	0.12		356	0.077	11	0.008	0.036	2.18	0.044	2.33
Coef. of Var.	7.028	3.78		10	17.580	6	2.231	9.519	3.50	8.284	4.54

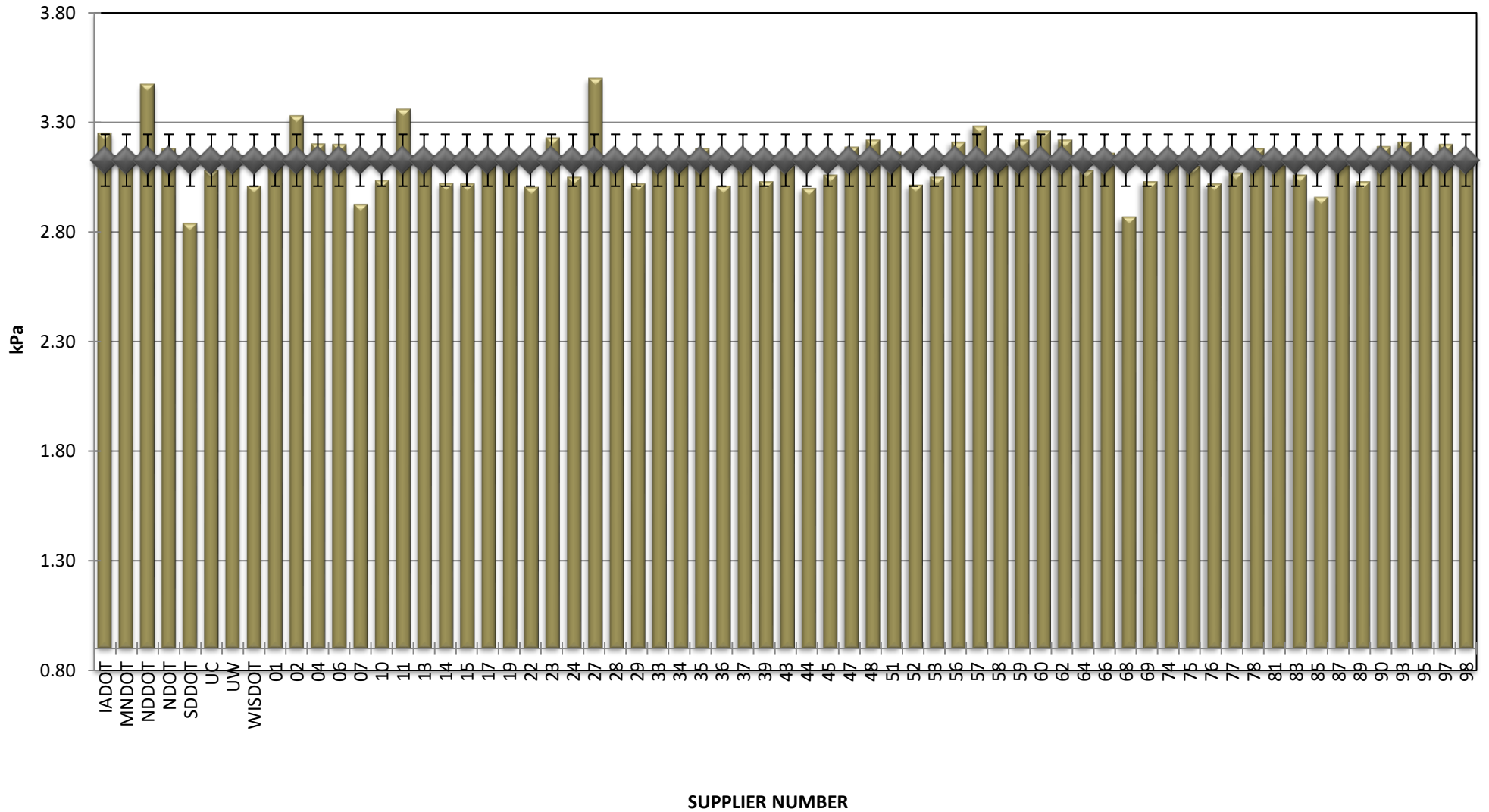
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-3
PG 58H-28**

ROTATIONAL VISCOSITY



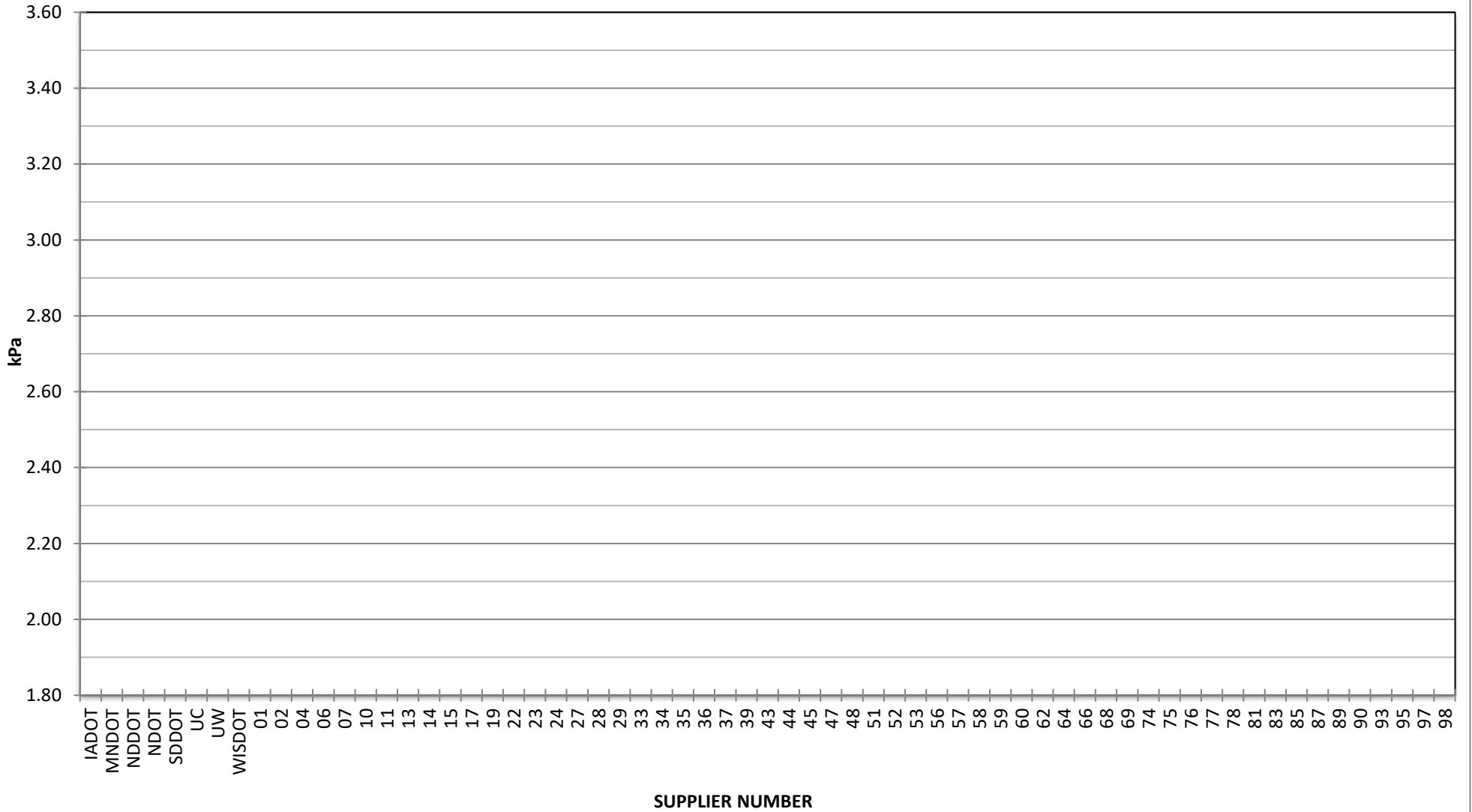
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-3
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DSR - ORIGINAL



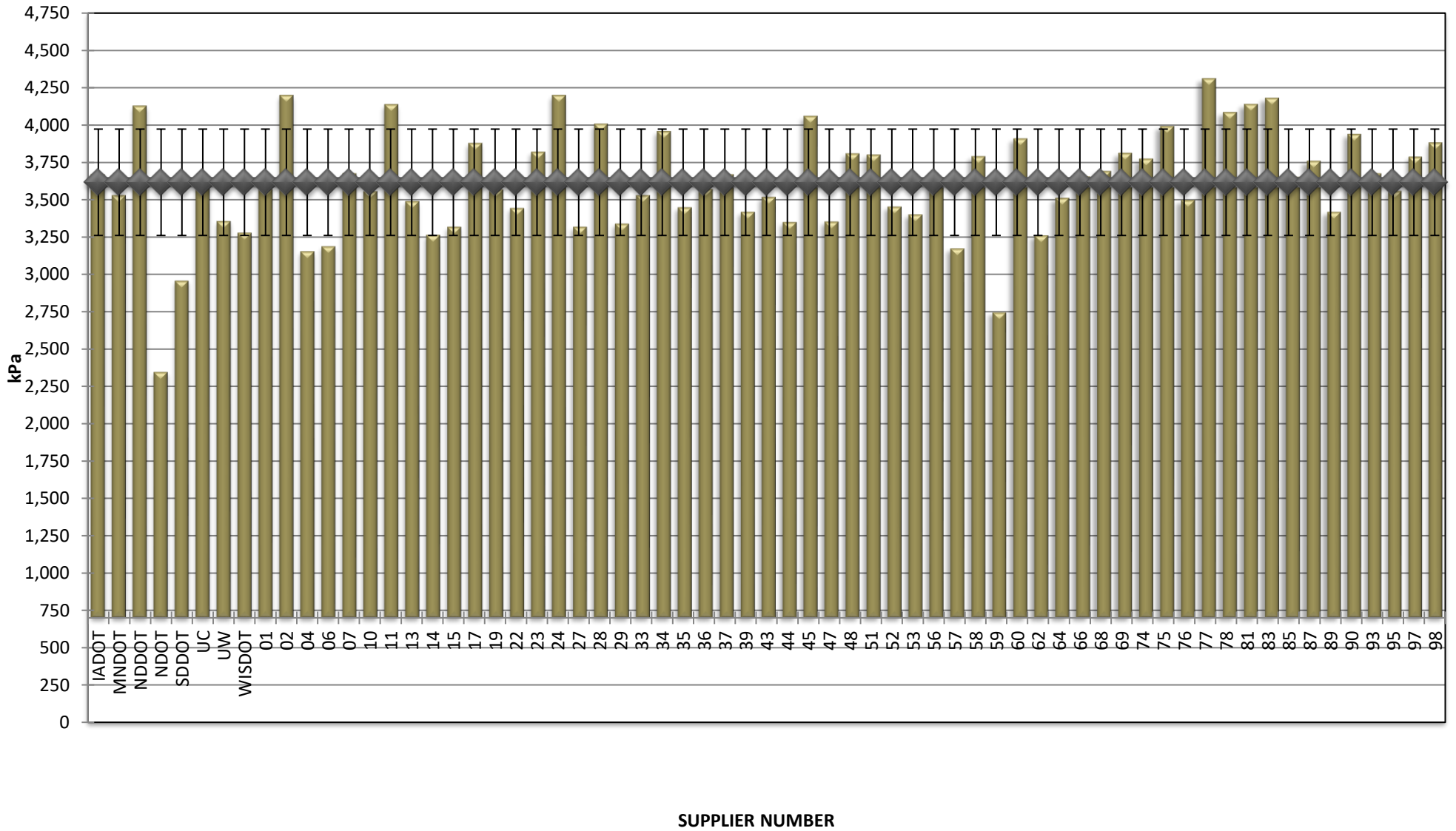
COMBINED STATE BINDER GROUP ROUND ROBIN
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DSR - RTFO



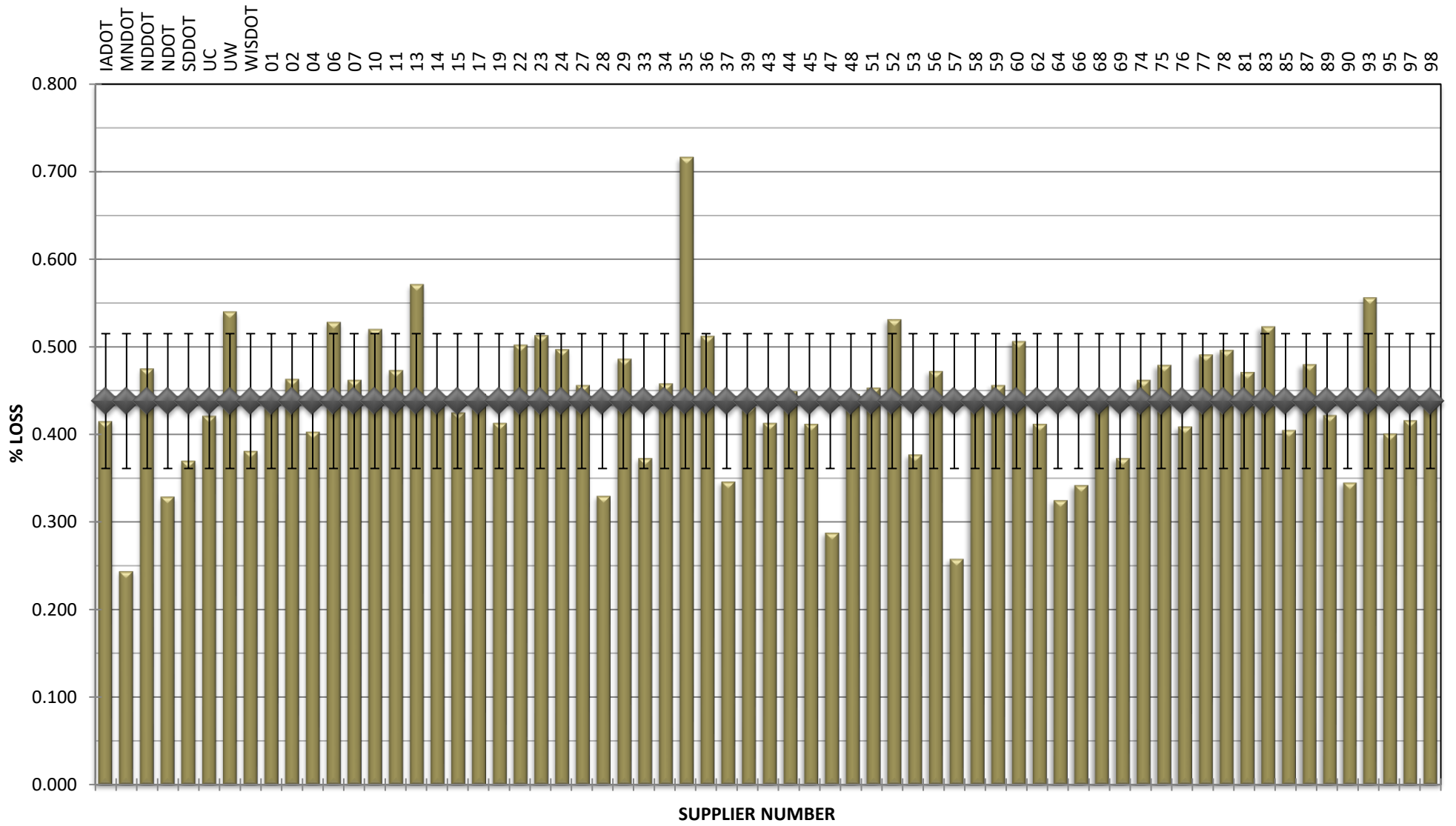
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-3
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DSR - PAV



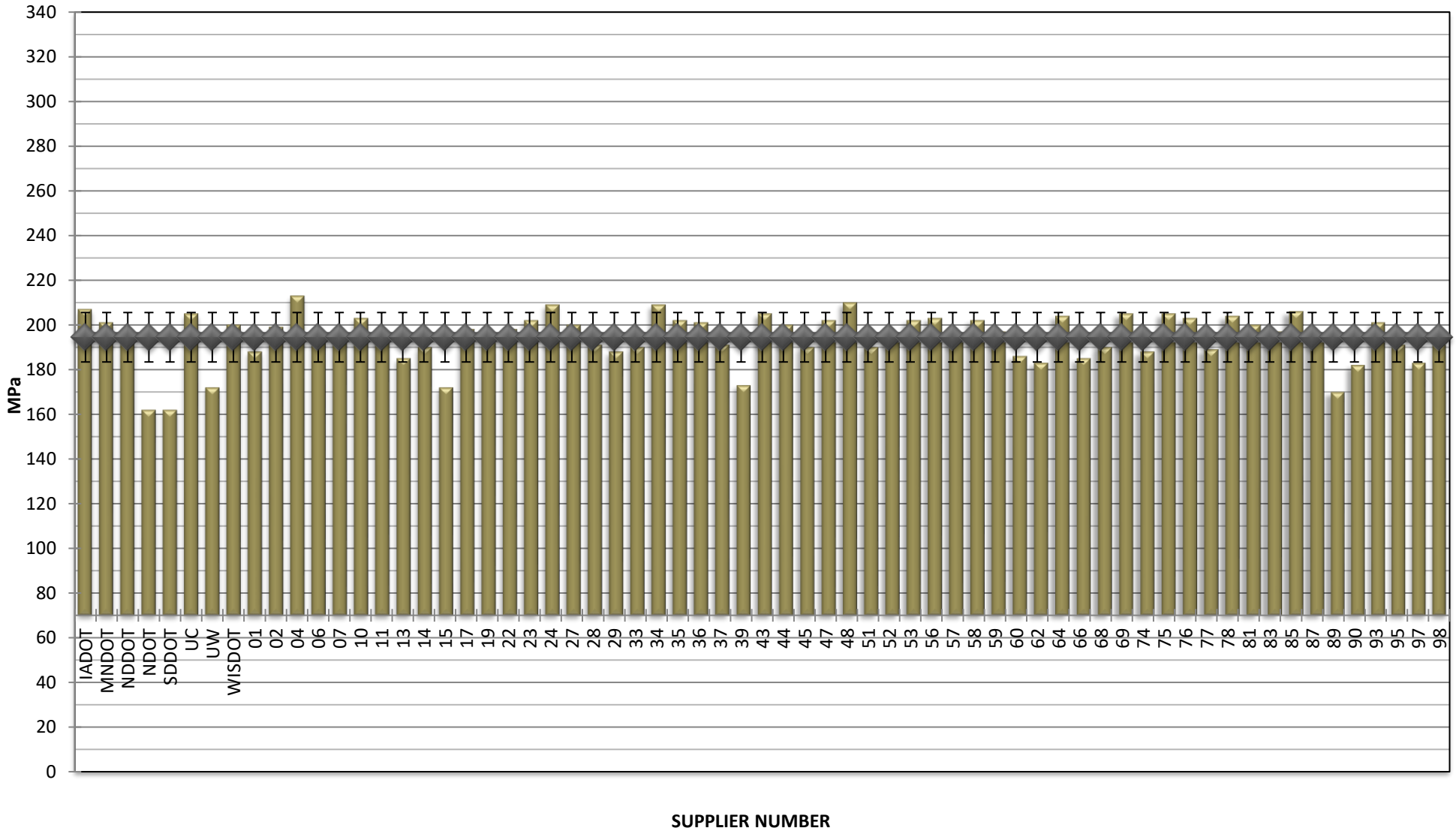
**COMBINED STATE BINDER GROUP ROUND ROBIN
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RTFO MASS LOSS



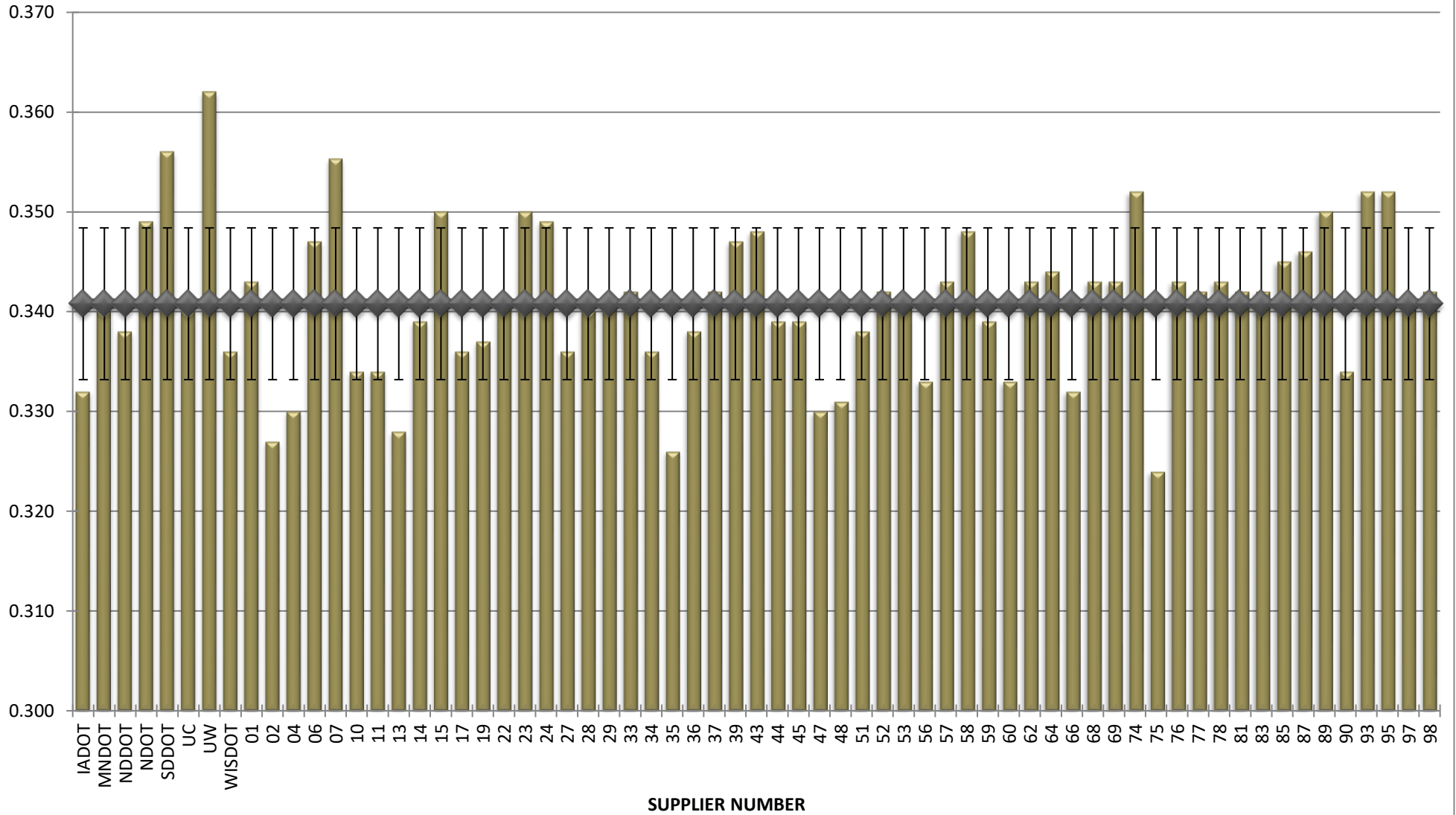
**COMBINED STATE BINDER GROUP ROUND ROBIN
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BBR STIFFNESS



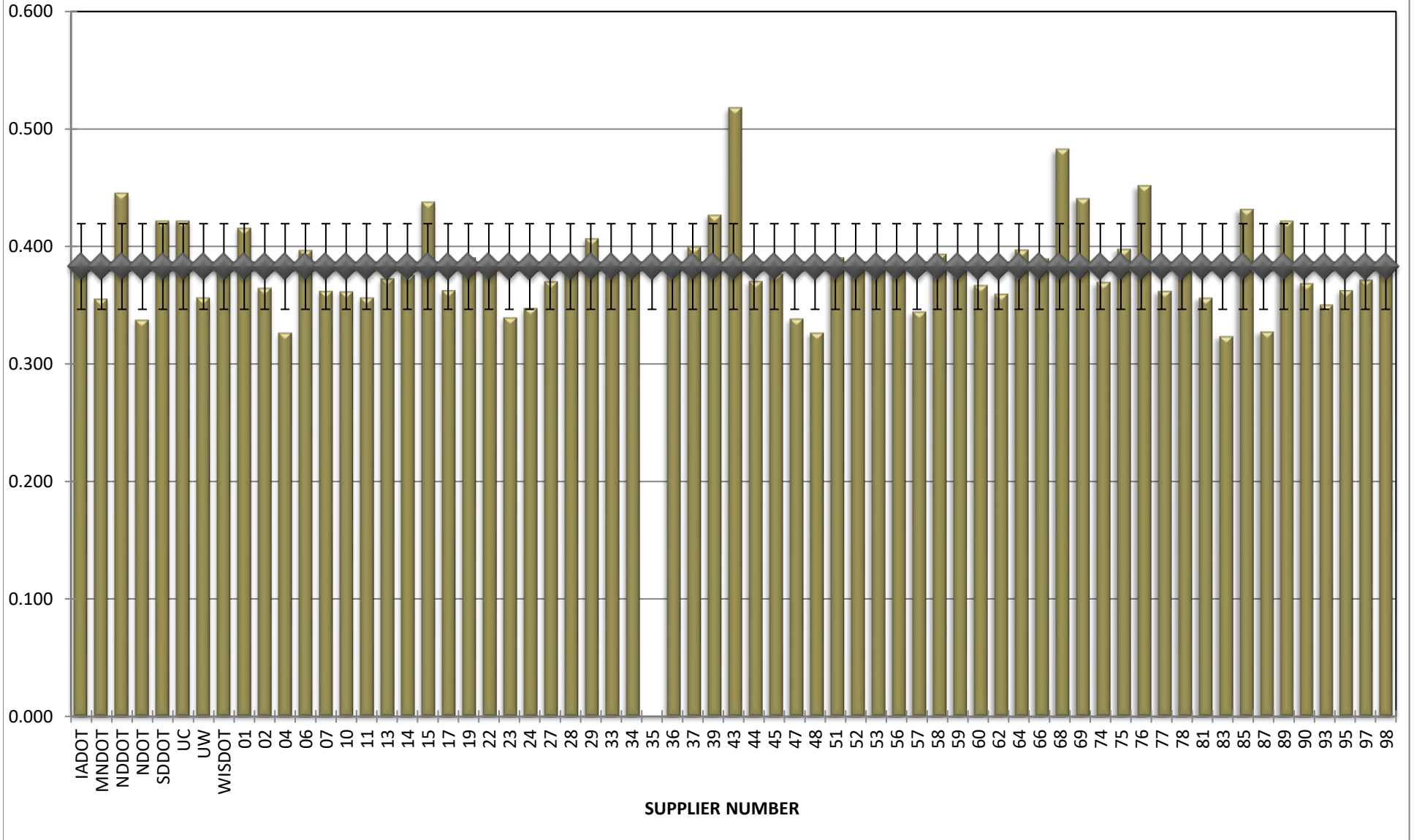
**COMBINED STATE BINDER GROUP ROUND ROBIN
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BBR m-VALUE



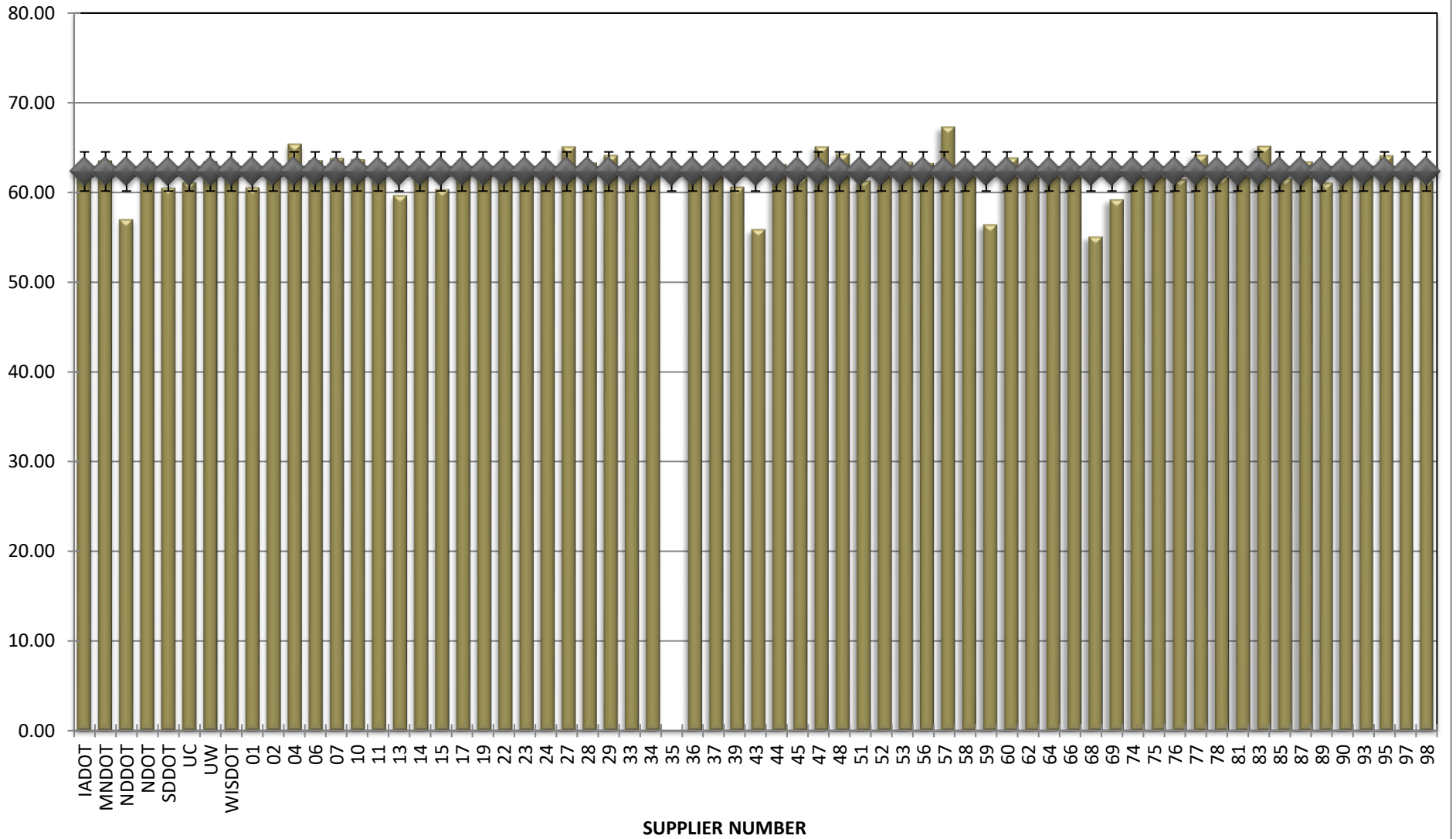
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-3
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Jnr @ 100 Pa



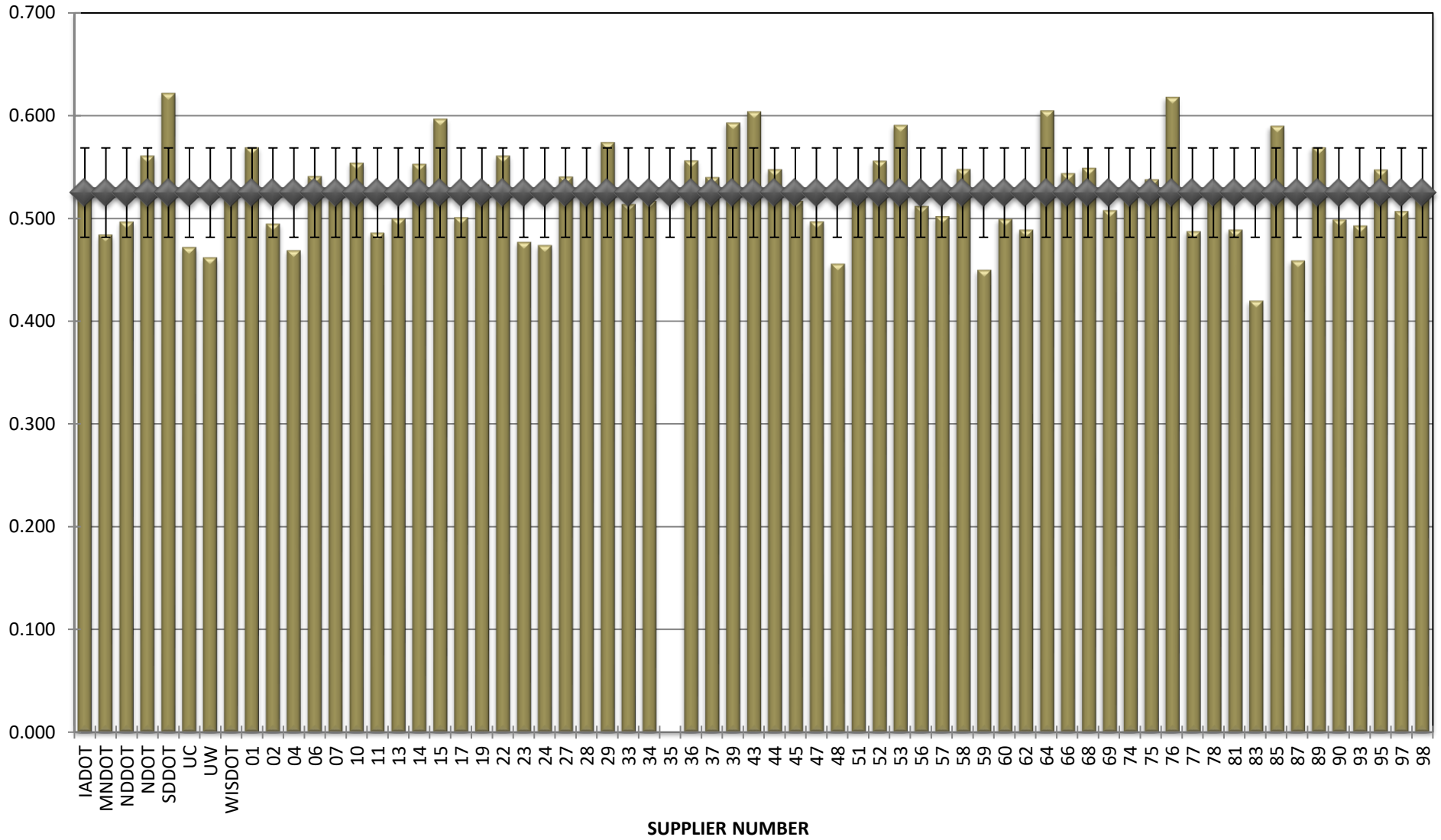
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-3
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% Recovery @ 100 Pa



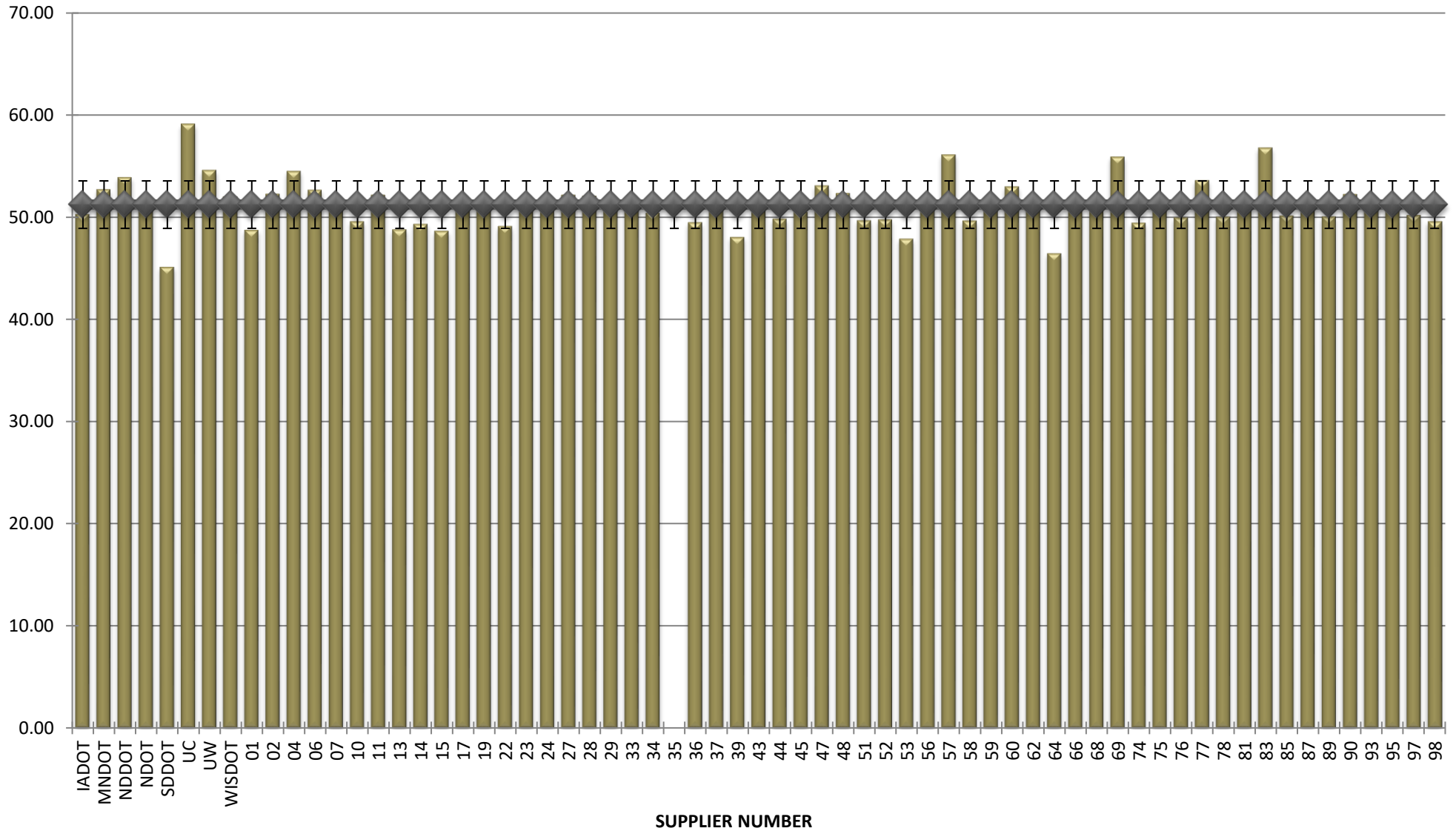
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A 2019-3
PG 58H-28**

Jnr @ 3200 Pa



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



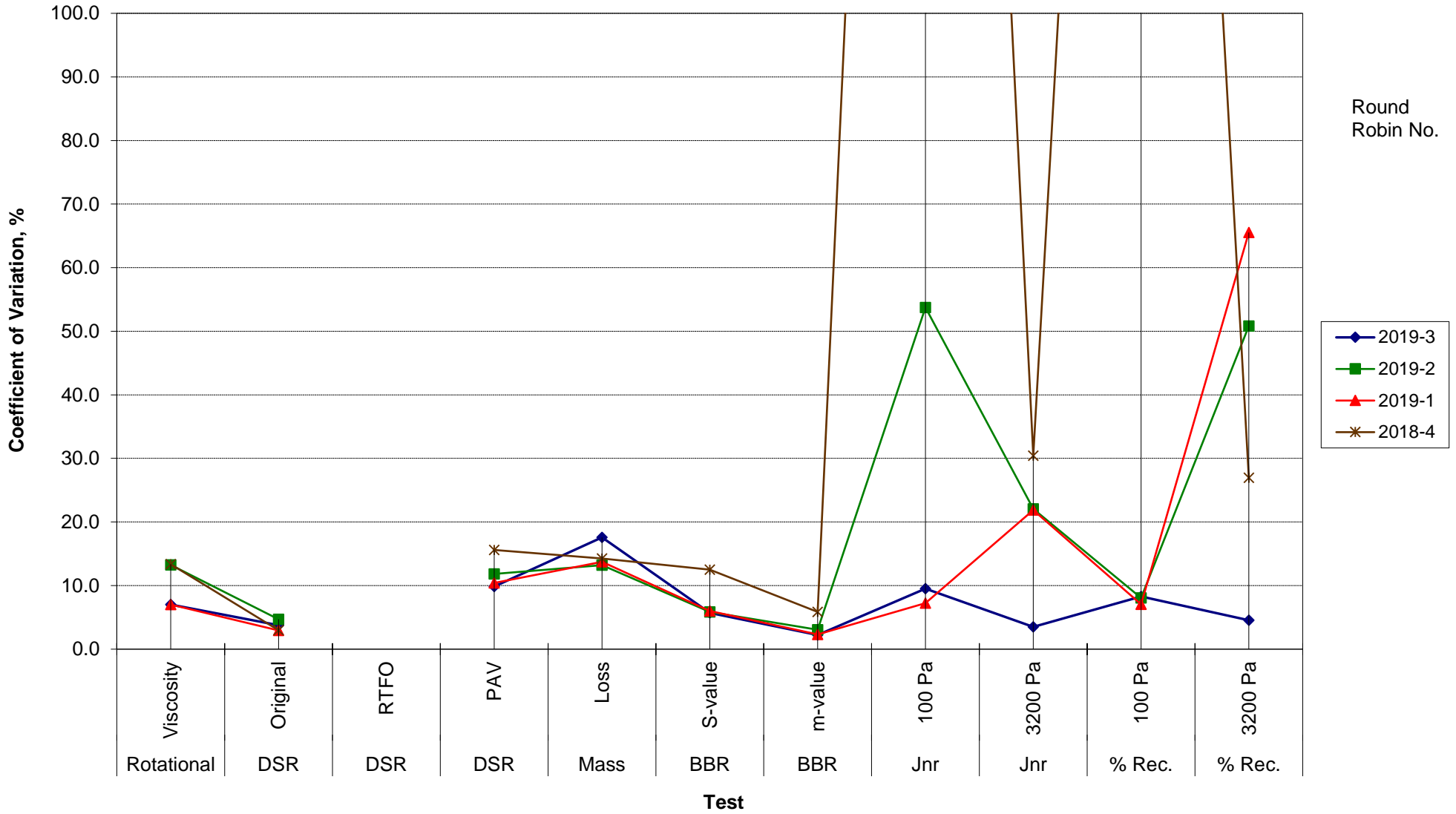
**COMBINED STATE BINDER GROUP ROUND ROBIN
SUMMARY A**

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
2019-3	66	7.028	3.779		9.848	17.580	5.691	2.231	9.519	3.499	8.284	4.540	33.516
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

**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	0.842	3.12		3,636	0.438	194	0.341	0.381	62.45	0.525	51.12
Std. Dev.	0.0424	0.1098		322.97	0.0690	11.11	0.0076	0.0326	1.9478	0.0437	2.0674
Coef. of Var.	5.028	3.517		8.881	15.746	5.714	2.225	8.566	3.119	8.324	4.045

**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
2019-3	66	7.0285	3.7792		9.8478	17.580086	5.690624	2.23106	9.518568	3.498796	8.283841	4.539972	33.51614