



OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS MANAGEMENT • 1600 W. BROAD ST. • COLUMBUS, OHIO 43223 •

(614) 275-1300 • LISA ZIGMUND, P.E., ADMINISTRATOR

JOHN R. KASICH, GOVERNOR • JERRY WRAY, DIRECTOR

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To: David Powers, Asphalt Engineer, Office of Materials Management

From: Eric Biehl, Asphalt Materials Engineer, Office of Materials Management

Subject: 2015 PG Binder Round Robin Results

PG Binder samples of PG 58-28 and PG 70-22M for the 2015 Round Robin were sent to 36 terminal and consulting labs. One lab decided not to participate and one lab hasn't submitted results. Each binder had a variety of tests to ensure labs were capable of performing correctly as well as a few informational tests. Our lab at Central Office also had two technicians perform testing. "ODOT A" is our normal technician who is responsible for running PG binder testing.

After all of the results were received, a statistical analysis was performed. In the results below, if the result is highlighted yellow then the result is one to two standard deviations from the average. If the result is highlighted orange then the result is more than two standard deviations from the average. If the result is not highlighted with yellow or orange, then the result is within one standard deviation from the average. Along with the standard deviation, we looked at the overall results and how each compared with the acceptable range laid out by AASHTO or ASTM as well as looked for specific trends and importance of the individual result.

After the statistical analysis was performed, a total of thirteen labs were asked to investigate and/or review specific test results further. Of those thirteen, seven were asked to investigate further into test results as there were significant issues and respond by Friday, March 20, 2015. The other labs' results were deemed sufficient and no responses were needed.

Ohio DOT 2015 PG Binder

PG 58-28	LAB #31	LAB #32	LAB #33	LAB #34	LAB #35	LAB #36	AVG	2 STD DEV	1 STD DEV	STD DEV	1 STD DEV	2 STD DEV
ROTATIONAL VISCOSITY	0.270		0.255		0.263		0.2626	0.2062	0.2344	0.0282	0.2908	0.3190
PENETRATION			123		126		126.758	111.394	119.076	7.682	134.440	142.122
COMPLEX MODULUS	1.19	1.33	1.22		1.16		1.201	1.106	1.153	0.047	1.248	1.295
PHASE ANGLE	87.3	87.2	87.1		87.4		87.31	86.99	87.15	0.16	87.47	87.63
ORIGINAL DSR	1.19	1.33	1.22		1.16		1.201	1.106	1.154	0.047	1.248	1.296
COMPLEX MODULUS			3.04		3.05		3.098	2.783	2.940	0.158	3.256	3.414
PHASE ANGLE			83.8		83.8		83.80	83.35	83.57	0.22	84.02	84.24
RTFO DSR			3.06		3.07		3.111	2.796	2.953	0.157	3.268	3.425
MASS CHANGE %			-0.200		-0.339		-0.283	-0.423	-0.353	0.070	-0.213	-0.143
PAV WITH VDO												
PHASE ANGLE			46.2		46.5		47.093	45.630	46.361	0.731	47.824	48.555
PAV DSR			4117		4569		4028.852	3107.439	3568.145	460.707	4489.558	4950.265
ESTIMATED STIFF 1			230		208		216.4	188.7	202.6	13.9	230.3	244.2
ESTIMATED STIFF 2			220		212		215.6	188.9	202.2	13.3	228.9	242.2
AVERAGE EST STIFF			225.0		210.0		216.5	189.6	203.0	13.4	229.9	243.3
RANGE			10		4		5.5	-3.7	0.9	4.6	10.1	14.7
M-VALUE 1			0.319		0.320		0.323	0.312	0.318	0.006	0.329	0.334
M-VALUE 2			0.315		0.318		0.323	0.311	0.317	0.006	0.329	0.335
AVERAGE M-VALUE			0.3170		0.3190		0.3233	0.3126	0.3180	0.0053	0.3286	0.3339
RANGE			0.004		0.002		0.0036	-0.0022	0.0007	0.0029	0.0065	0.0094
PG 70-22M												
ROTATIONAL VISCOSITY	1.260		1.216		1.293		1.2966	1.1071	1.2018	0.0947	1.3913	1.4861
COMPLEX MODULUS	1.85	2.10	2.07		1.93		1.991	1.805	1.898	0.093	2.084	2.177
PHASE ANGLE	69.9	69.7	69.4		69.7		69.93	66.68	68.31	1.63	71.56	73.19
ORIGINAL DSR	1.92	2.23	2.22		2.06		2.113	1.915	2.014	0.099	2.212	2.311
COMPLEX MODULUS			4.44		4.19		4.307	3.762	4.034	0.273	4.580	4.853
PHASE ANGLE			64.5		65.0		65.09	64.37	64.73	0.36	65.45	65.81
RTFO DSR			4.92		4.62		4.717	4.113	4.415	0.302	5.019	5.321
ELASTIC RECOVERY			76.8		75.0		76.7	73.1	74.9	1.8	78.5	80.3
PAV WITH VDO												
PHASE ANGLE			44.9		45.7		46.1	44.5	45.3	0.8	46.9	47.7
PAV DSR			2229		2109		2081.2	1657.3	1869.3	211.9	2293.1	2505.0
ESTIMATED STIFF 1			119		112		116.6	106.0	111.3	5.3	121.9	127.2
ESTIMATED STIFF 2			121		109		117.5	104.4	111.0	6.6	124.1	130.6
AVERAGE EST STIFF			120.0		110.5		117.2	106.0	111.6	5.6	122.8	128.4
RANGE			2		3		3.4	-1.9	0.7	2.7	6.0	8.7
M-VALUE 1			0.325		0.321		0.326	0.311	0.318	0.008	0.334	0.342
M-VALUE 2			0.322		0.323		0.326	0.310	0.318	0.008	0.334	0.342
AVERAGE M-VALUE			0.3235		0.3220		0.3264	0.3106	0.3185	0.0079	0.3343	0.3422
RANGE			0.003		0.002		0.0021	-0.0013	0.0004	0.0017	0.0038	0.0055
MSCR at 64 °C on Original												
Avg % Recovery @ 3.2 kPa			39.32		38.50		38.205	28.897	33.551	4.654	42.859	47.513
Jnr @ 3.2 kPa			1.12		1.20		1.297	0.360	0.829	0.469	1.766	2.235
% Diff. between Jnr			40.74		45.94		49.963	28.193	39.078	10.885	60.848	71.733
MSCR at 64 °C on RTFO												
Avg % Recovery @ 3.2 kPa			60.25		58.96		59.096	50.953	55.025	4.071	63.167	67.238
Jnr @ 3.2 kPa			0.28		0.31		0.308	0.081	0.194	0.114	0.421	0.535
% Diff. between Jnr			17.81		23.66		23.623	5.598	14.610	9.013	32.635	41.648
Between 1 & 2 Std. Dev												
Greater than 2 Std Dev												