

Figure A-29: 4 Mixes @ 4% Voids & 0°C

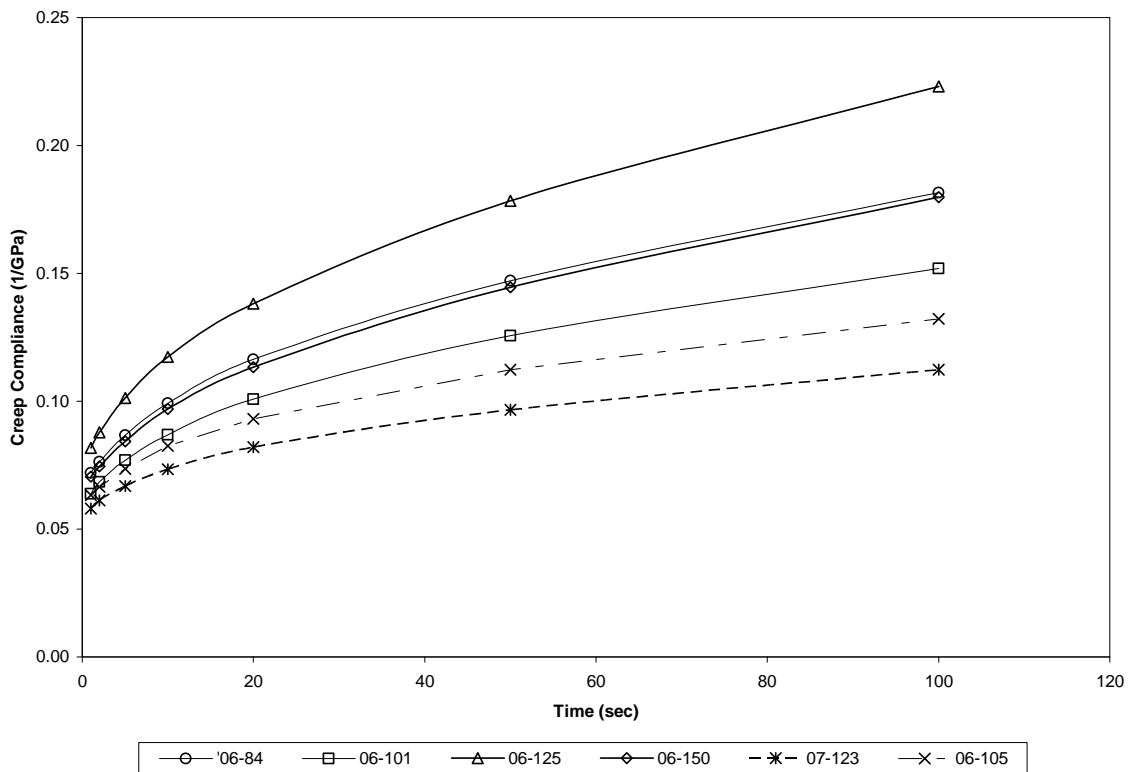


Figure A-30: 6 Mixes @ 6.5% Voids & 0°C

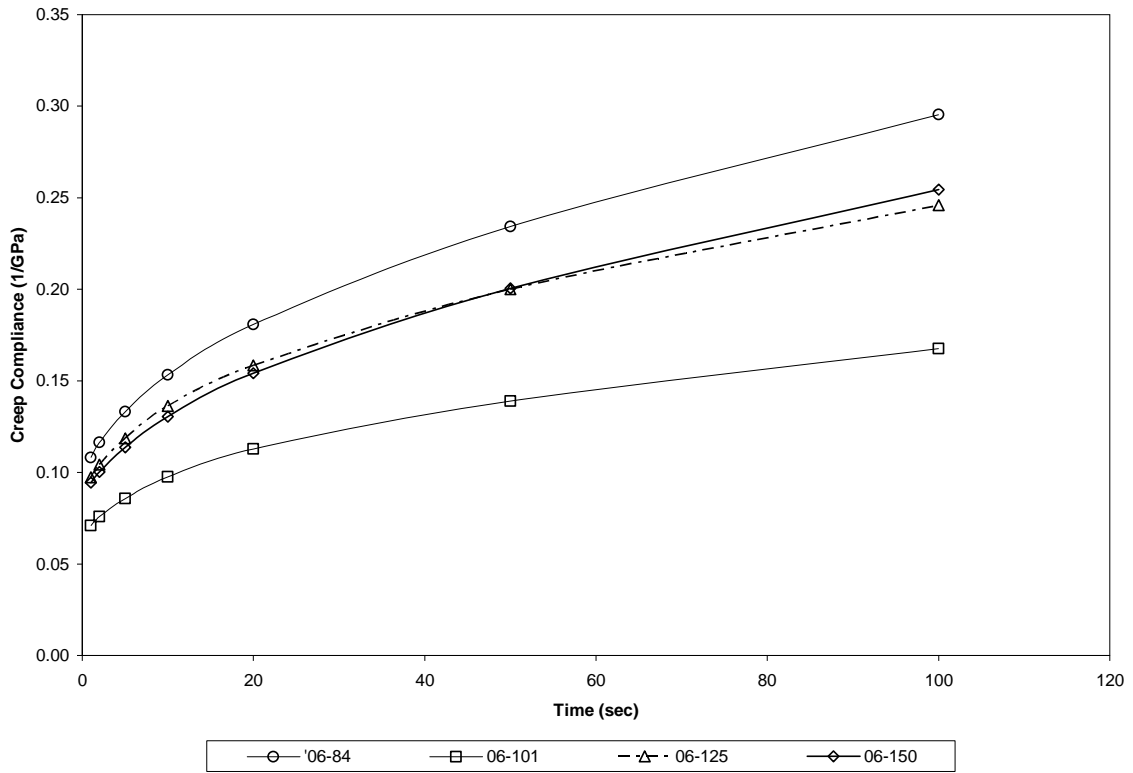


Figure A-31: 4 Mixes @ 9% Voids & 0°C

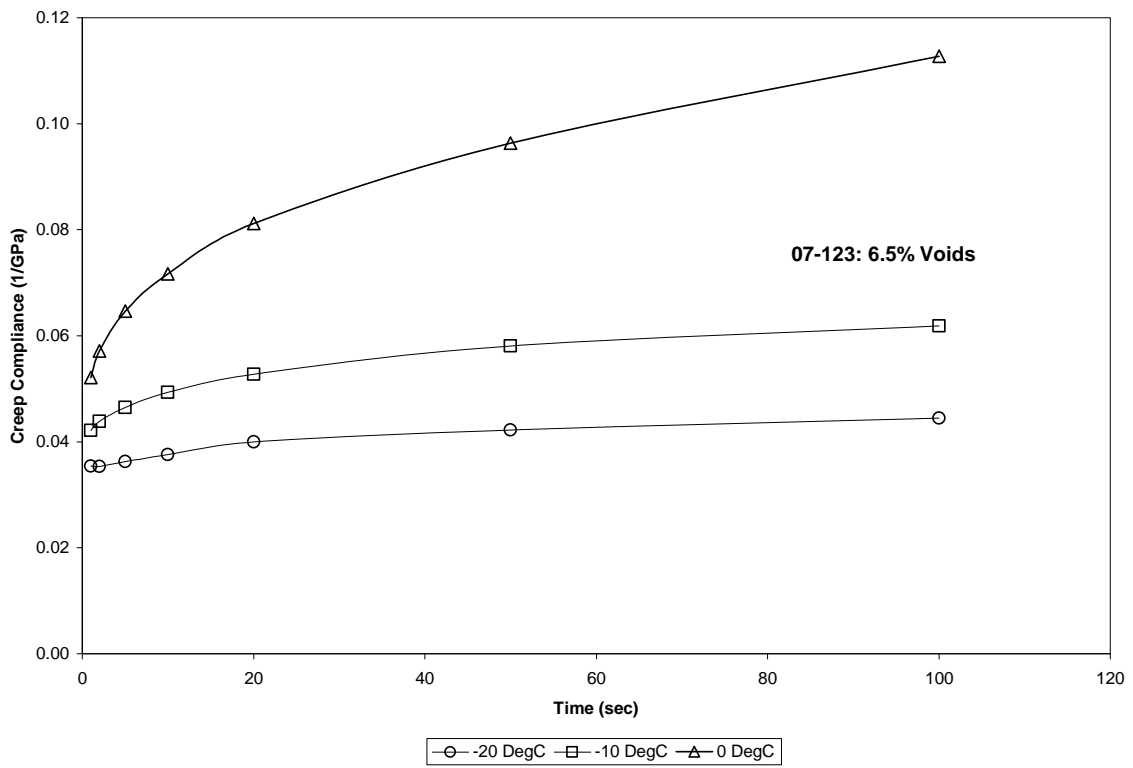


Figure A-32: 07-123 Using Equivalent Area Method

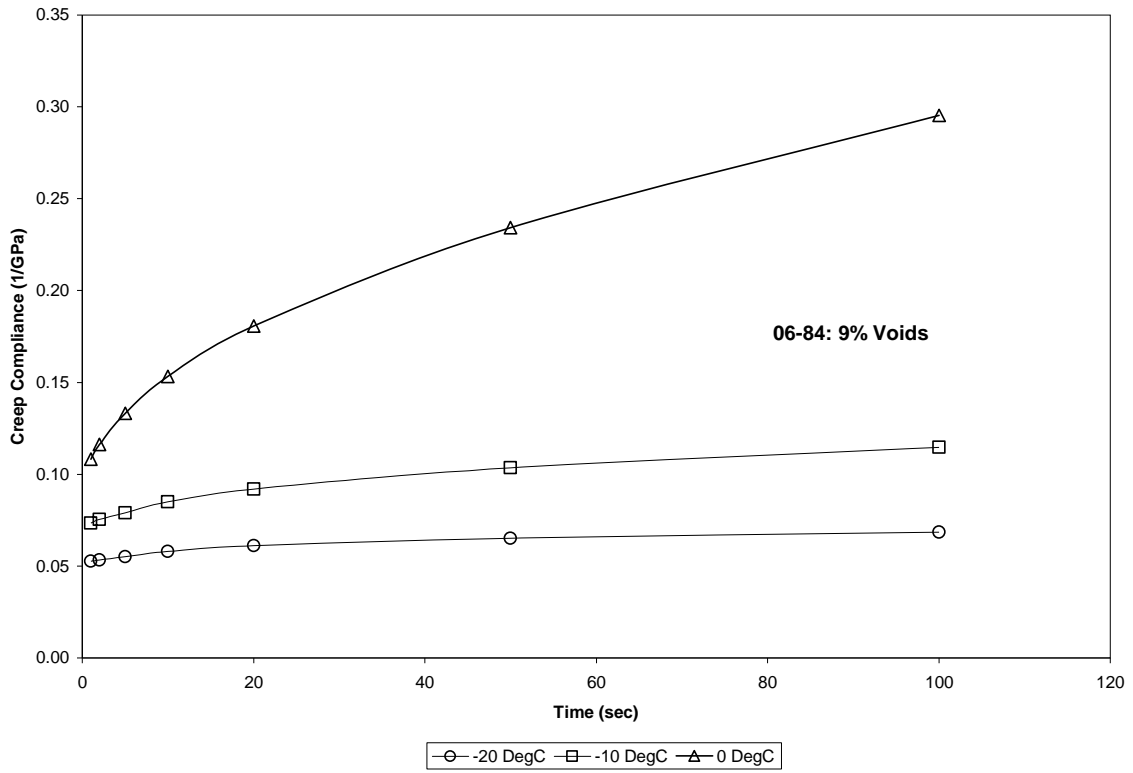


Figure A-35: 06-84 @ 9% Voids: Round 2

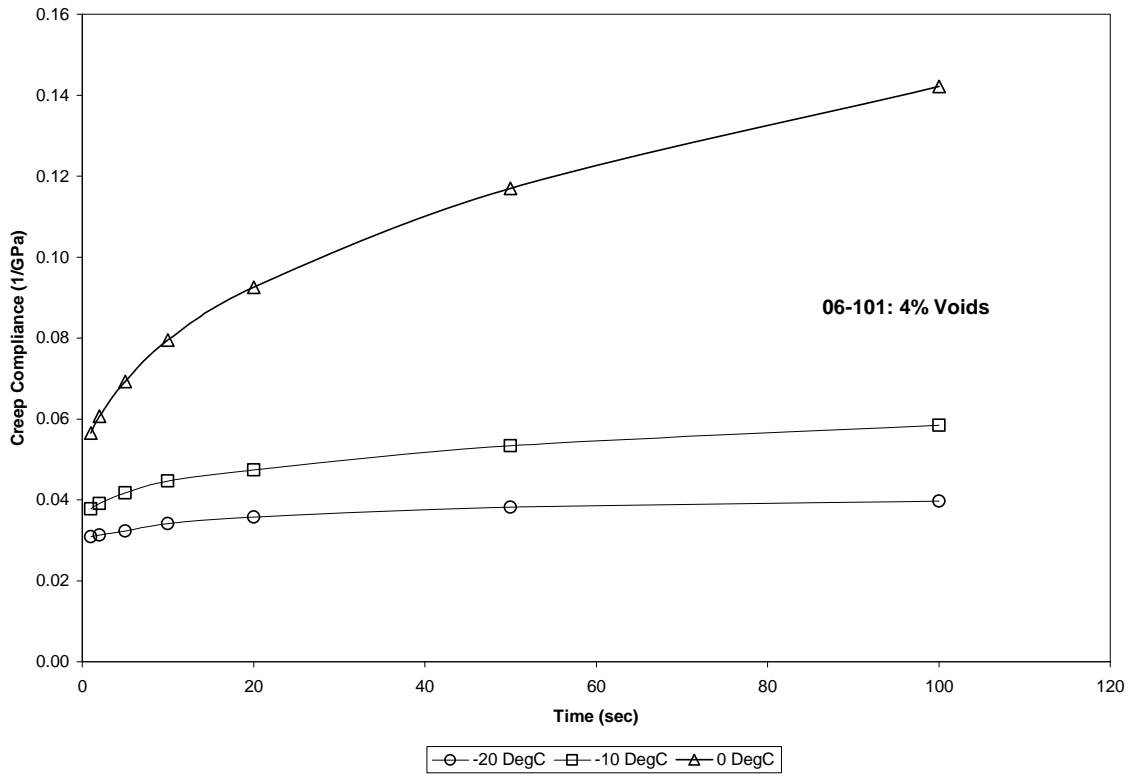


Figure A-36: 06-101 @ 4% Voids

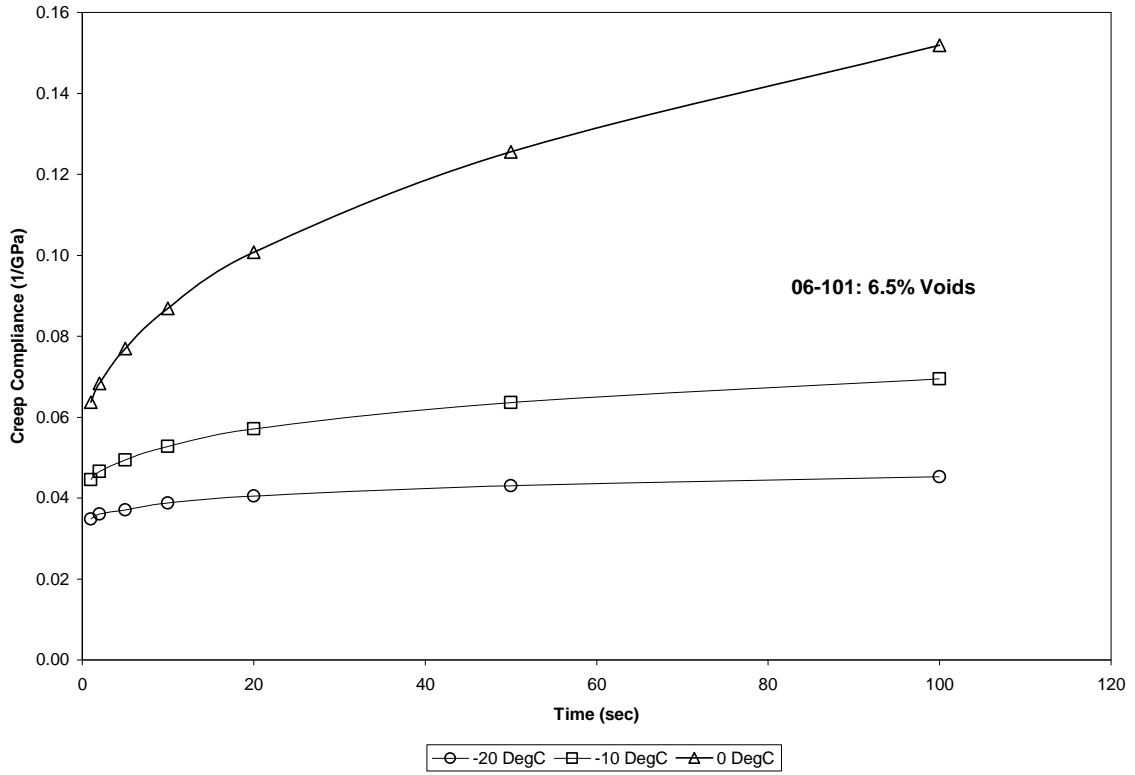


Figure A-37: 06-101 @ 6.5% Voids

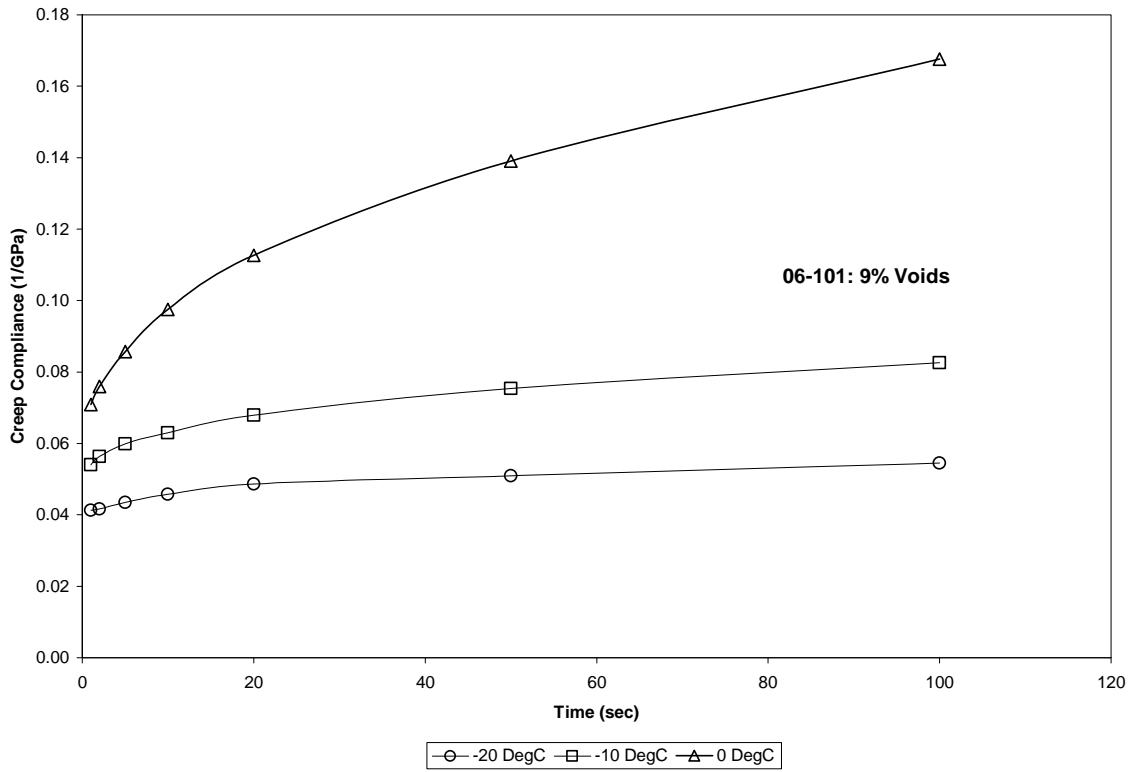


Figure A-38: 06-101 @ 9% Voids

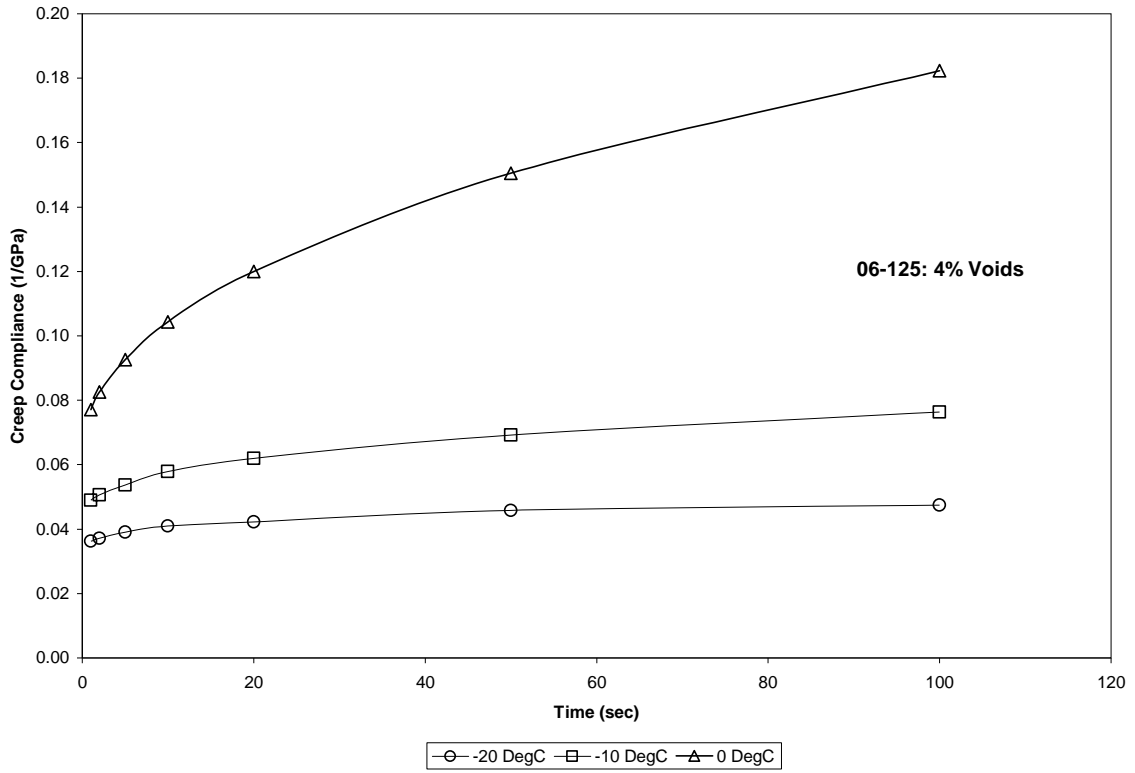


Figure A-39: 06-125 @ 4% Voids

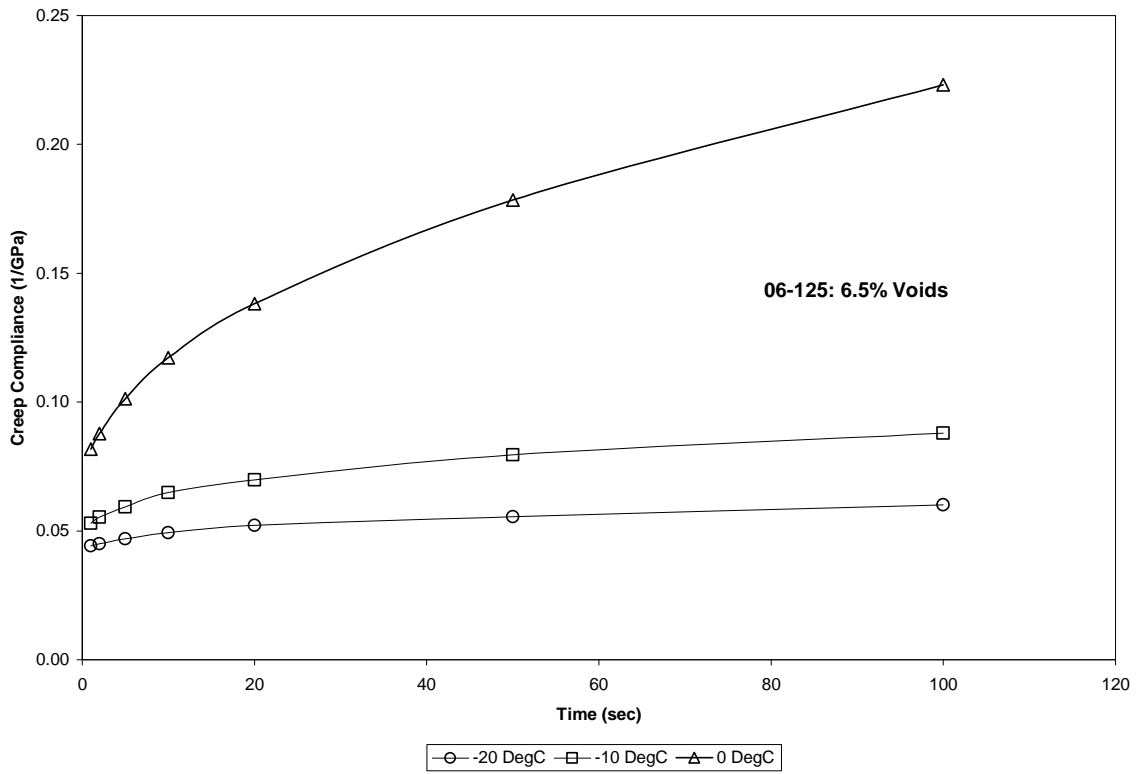


Figure A-40: 06-125 @ 6.5% Voids

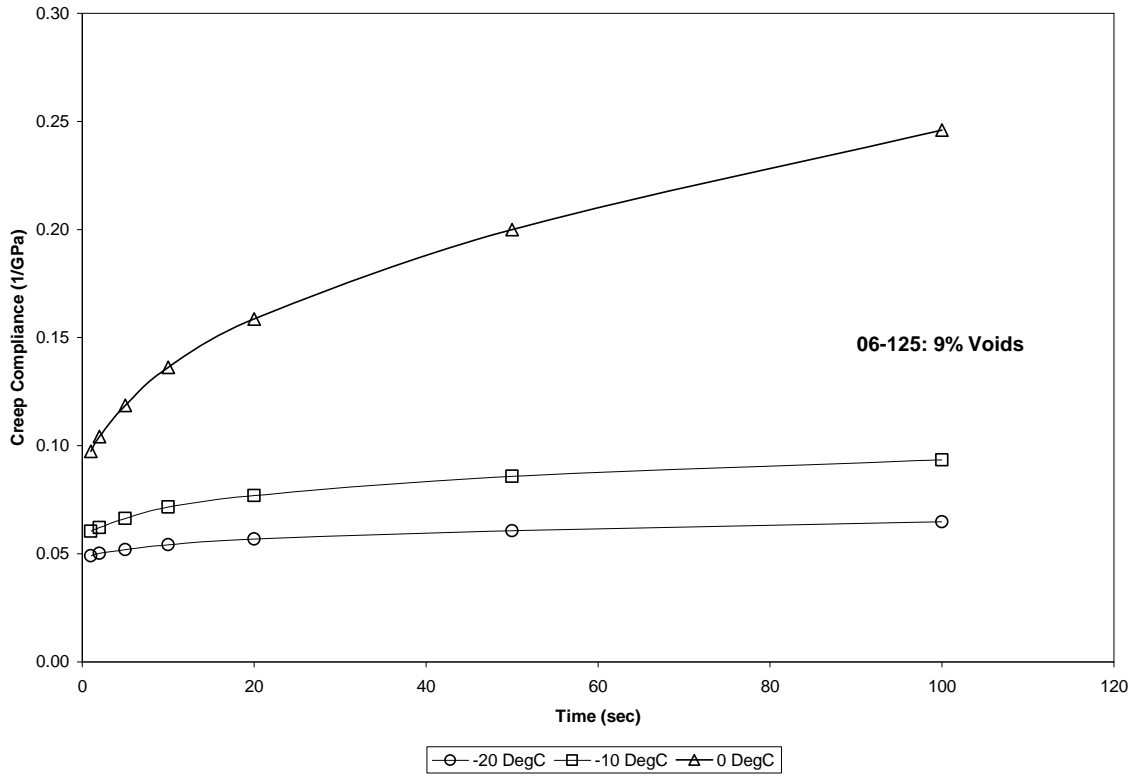


Figure A-41: 06-125 @ 9% Voids

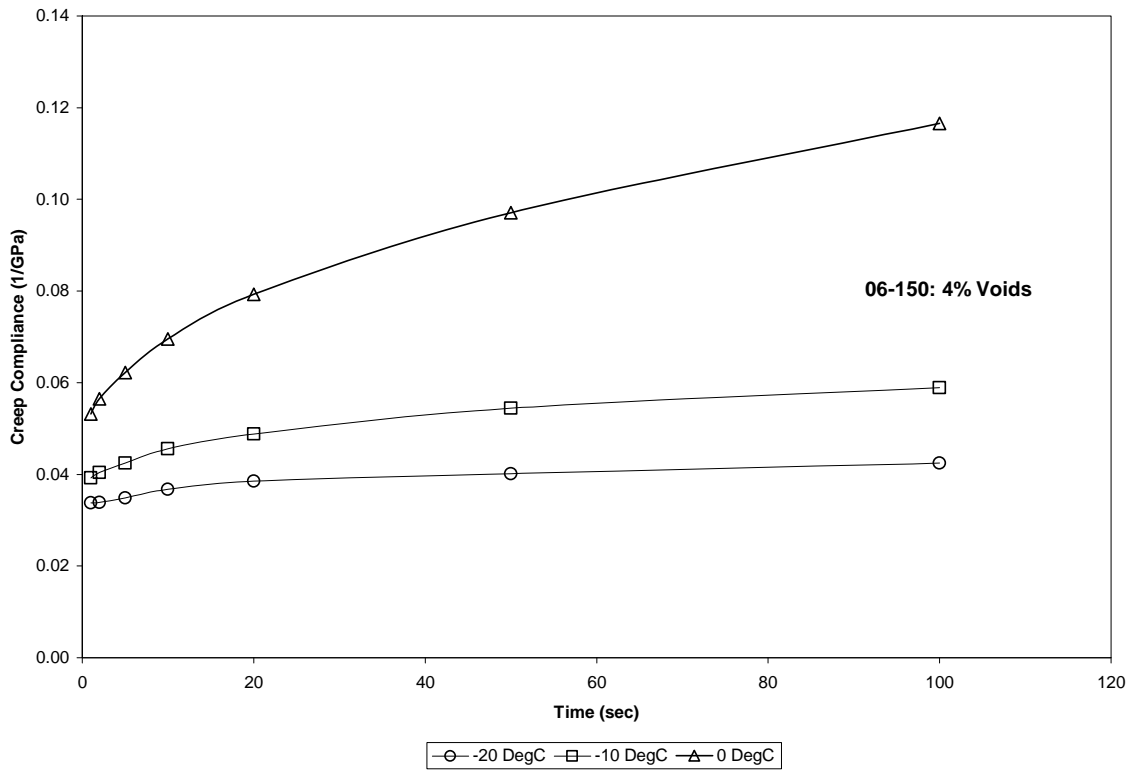


Figure A-42: 06-150 @ 4% Voids

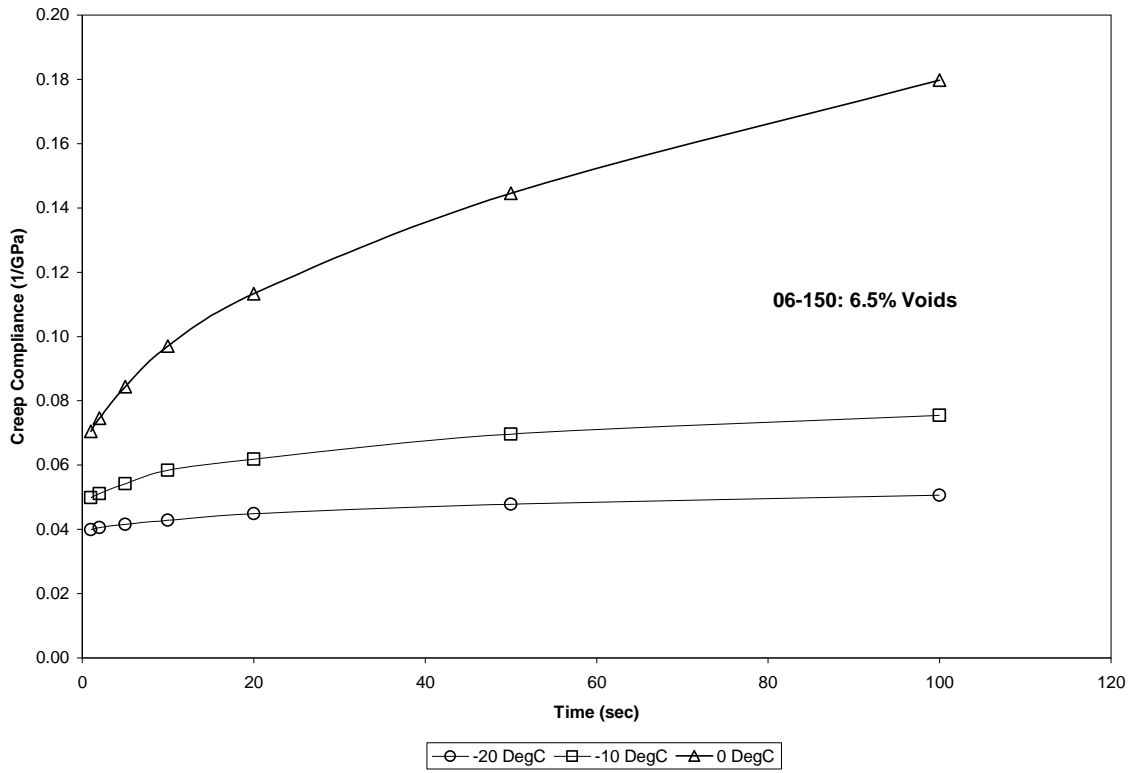


Figure A-43: 06-150 @ 6.5% Voids

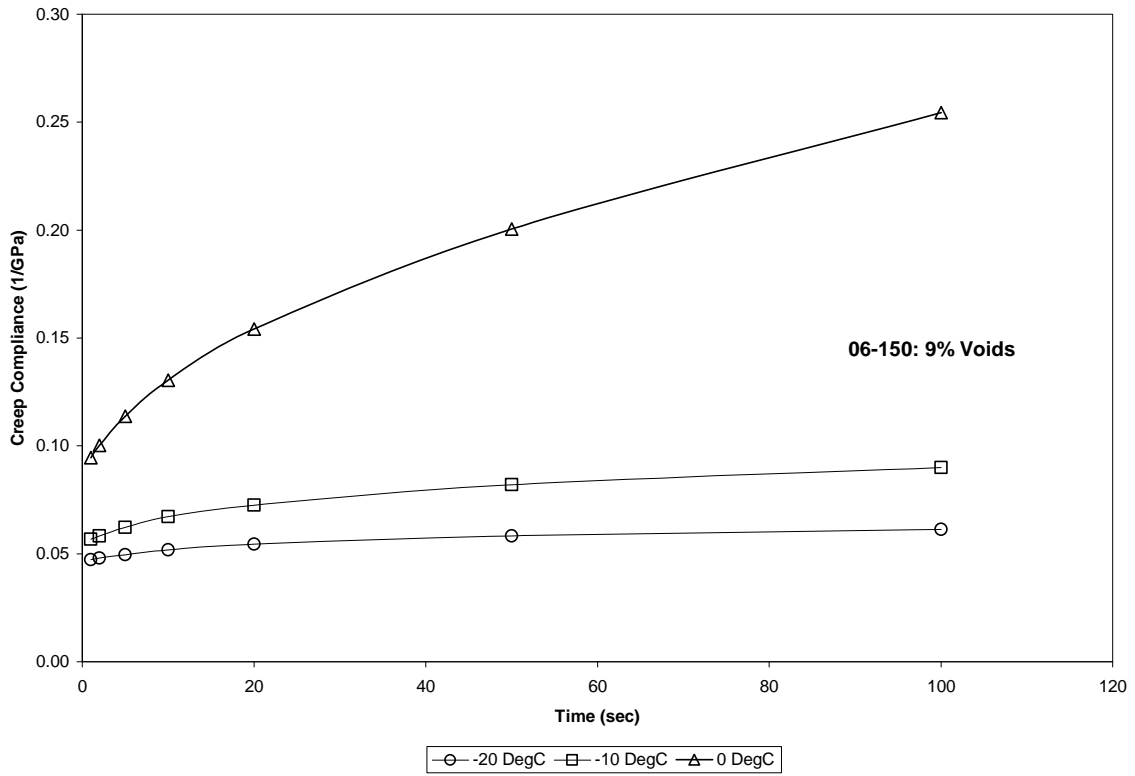


Figure A-44: 06-150 @ 9% Voids

APPENDIX B: TENSILE STRENGTH & TENSILE FAILURE STRAIN

Table B-19: Non-instrumented Data @ -10°C: Part A

Mix Designation	07-123	%RAP	20.0									
Mix Type	BP1	RAP %AC	5.7									
Virgin Binder Grade	PG64-22	Total %AC	5.3									
%Virgin AC	4.2	%Fibers	0.0									
Gmm	2.501											
Tensile Strength												
AASHTO T 322-07												
NCHRP 530 Correction												
Specimen No.	Gmb	Voids (%)	Thickness (in) (mm)	Diameter (in) (mm)	Temp (deg C)	Pf.n (lbf)	St.n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	St.n (psi)	Avg. St (psi)
2	2.333	6.7	1.991 50.6	5.895 149.7	-10.0	13322.8	723				602	
3	2.338	6.5	1.991 50.6	5.898 149.8	-9.7	11937.3	647	649	73.2	11.3%	543	544
14	2.342	6.3	1.994 50.6	5.899 149.8	-9.6	10645.8	576				487	
Average	2.338	6.5	1.992 50.6	5.897 149.8	-9.8							
5	2.334	6.7	1.994 50.6	5.901 149.9	-9.5	8598.6	465				401	
13	2.342	6.4	1.997 50.7	5.897 149.8	-9.6	11264.6	609	576	98.1	17.0%	513	487
15	2.344	6.3	2.001 50.8	5.898 149.8	-9.5	12101.4	653				547	
Average	2.340	6.5	1.997 50.7	5.899 149.8	-9.5	Statistics for All 6		612	87.2	14.2%		515

Mix Designation	06-105	%RAP	10.0									
Mix Type	SP125C	RAP %AC	4.8									
Virgin Binder Grade	PG70-22	Total %AC	5.6									
%Virgin AC	5.1	%Fibers	0.0									
Gmm	2.455											
Tensile Strength												
AASHTO T 322-07												
NCHRP 530 Correction												
Specimen No.	Gmb	Voids (%)	Thickness (in) (mm)	Diameter (in) (mm)	Temp (deg C)	Pf.n (lbf)	St.n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	St.n (psi)	Avg. St (psi)
2	2.290	6.7	1.72 43.7	5.92 150.4	-9.5	9610.6	601				507	
5	2.295	6.5	1.72 43.7	5.92 150.4	-9.5	9784.5	612	616	18.2	3.0%	515	519
11	2.301	6.3	1.72 43.7	5.92 150.4	-9.5	10178.2	636				534	
Average	2.295	6.5	1.72 43.7	5.92 150.4	-9.5							

Mix Designation	06-84	%RAP	0.0									
Mix Type	SP125BSM	RAP %AC	0.0									
Virgin Binder Grade	PG76-22	Total %AC	6.3									
%Virgin AC	6.3	%Fibers	0.3									
Gmm	2.436											
Tensile Strength												
AASHTO T 322-07												
NCHRP 530 Correction												
Specimen No.	Gmb	Voids (%)	Thickness (in) (mm)	Diameter (in) (mm)	Temp (deg C)	Pf.n (lbf)	St.n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	St.n (psi)	Avg. St (psi)
2	2.344	3.8	1.990 50.5	5.903 149.9	-9.7	13924.6	755				627	
3	2.339	4.0	1.997 50.7	5.905 150.0	-9.5	13849.5	748	738	22.9	3.1%	621	614
16	2.334	4.2	1.999 50.8	5.906 150.0	-9.6	13204.3	712				593	
Average	2.339	4.0	1.995 50.7	5.905 150.0	-9.6							
7	2.282	6.3	1.967 50.0	5.895 149.7	-9.5	11626.0	638				536	
11	2.272	6.7	1.985 50.4	5.896 149.8	-9.6	10888.7	592	620	24.4	3.9%	500	522
14	2.277	6.5	1.977 50.2	5.901 149.9	-9.7	11538.1	630				529	
Average	2.277	6.5	1.976 50.2	5.897 149.8	-9.6							
6	2.211	9.2	1.984 50.4	5.907 150.0	-9.8	9439.1	513				438	
14	2.222	8.8	1.991 50.6	5.905 150.0	-10.3	10172.1	551	525	22.7	4.3%	468	447
19	2.217	9.0	1.983 50.4	5.906 150.0	-9.8	9390.9	510				436	
Average	2.217	9.0	1.986 50.4	5.906 150.0	-10.0							

Table B-20: Non-instrumented Data @ -10°C: Part B

Mix Designation			06-101		%RAP	0.0								
Mix Type			SP125B		RAP %AC	0.0								
Virgin Binder Grade			PG76-22		Total %AC	5.7								
%Virgin AC			5.7		%Fibers	0.0								
Gmm			2.515											
Tensile Strength														
AASHTO T 322-07														
NCHRP 530 Correction														
Specimen No.	Gmb	Voids (%)	Thickness		Diameter		Temp (deg C)	Pf,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	St,n (psi)	Avg. St (psi)
			(in)	(mm)	(in)	(mm)								
4	2.421	3.8	1.985	50.4	5.895	149.7	-9.9	15002.8	816				675	
7	2.415	4.0	2.006	51.0	5.896	149.8	-10.0	16547.0	891	841	42.8	5.1%	733	694
11	2.410	4.2	2.003	50.9	5.897	149.8	-10.0	15153.9	817				675	
Average	2.415	4.0	1.998	50.7	5.896	149.8	-10.0	highlighted cells are Tinius-Olsen values						
2	2.352	6.5	1.988	50.5	5.898	149.8	-9.8	12315.1	669				560	
10	2.347	6.7	1.989	50.5	5.903	149.9	-9.7	11901.9	645	663	16.1	2.4%	541	555
17	2.357	6.3	1.999	50.8	5.904	150.0	-9.8	12535.4	676				565	
Average	2.352	6.5	1.992	50.6	5.902	149.9	-9.8							
4	2.284	9.2	1.992	50.6	5.903	149.9	-9.8	10836.2	587				496	
6	2.288	9.0	1.989	50.5	5.902	149.9	-9.6	11270.8	611	601	12.8	2.1%	515	507
18	2.294	8.8	1.994	50.6	5.908	150.1	-10.0	11196.9	605				510	
Average	2.289	9.0	1.992	50.6	5.904	150.0	-9.8							

Mix Designation			06-125		%RAP	0.0								
Mix Type			SP125C		RAP %AC	0.0								
Virgin Binder Grade			PG64-22		Total %AC	6.5								
%Virgin AC			6.5		%Fibers	0.0								
Gmm			2.412											
Tensile Strength														
AASHTO T 322-07														
NCHRP 530 Correction														
Specimen No.	Gmb	Voids (%)	Thickness		Diameter		Temp (deg C)	Pf,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	St,n (psi)	Avg. St (psi)
			(in)	(mm)	(in)	(mm)								
1	2.315	4.0	1.976	50.2	5.908	150.1	-9.6	12191.2	665				557	
20	2.321	3.8	2.001	50.8	5.904	150.0	-9.9	13492.4	727	696	31.1	4.5%	605	581
24	2.331	4.2	2.004	50.9	5.906	150.0	-9.9	12926.6	695				580	
Average	2.322	4.0	1.994	50.6	5.906	150.0	-9.8							
18	2.249	6.7	1.998	50.7	5.911	150.1	-9.7	11544.2	622				523	
23	2.260	6.3	1.991	50.6	5.903	149.9	-9.6	11703.5	634	623	10.0	1.6%	532	524
24	2.255	6.5	1.961	49.8	5.911	150.1	-9.7	11181.0	614				517	
Average	2.255	6.5	1.983	50.4	5.908	150.1	-9.7							
4	2.190	9.2	2.001	50.8	5.912	150.2	-9.6	9657.6	520				443	
6	2.196	9.0	1.989	50.5	5.908	150.1	-9.5	9892.0	536	532	11.2	2.1%	456	453
8	2.200	8.8	1.970	50.0	5.909	150.1	-9.6	9896.2	541				460	
Average	2.195	9.0	1.987	50.5	5.910	150.1	-9.6							

Mix Designation			06-150		%RAP	10.0								
Mix Type			SP125C		RAP %AC	4.8								
Virgin Binder Grade			PG70-22		Total %AC	5.5								
%Virgin AC			5.0		%Fibers	0.0								
Gmm			2.467											
Tensile Strength														
AASHTO T 322-07														
NCHRP 530 Correction														
Specimen No.	Gmb	Voids (%)	Thickness		Diameter		Temp (deg C)	Pf,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	St,n (psi)	Avg. St (psi)
			(in)	(mm)	(in)	(mm)								
2	2.364	4.2	1.980	50.3	5.904	150.0	-9.5	13949.6	760				631	
6	2.369	4.0	1.973	50.1	5.901	149.9	-9.6	13838.6	757	786	48.8	6.2%	628	651
11	2.370	3.9	1.987	50.5	5.900	149.9	-9.5	15516.3	843				695	
Average	2.368	4.0	1.980	50.3	5.902	149.9	-9.5	highlighted cells are Tinius-Olsen values						
4	2.301	6.7	1.985	50.4	5.906	150.0	-9.6	11771.2	639				537	
9	2.313	6.2	1.981	50.3	5.901	149.9	-9.6	12719.1	693	674	30.3	4.5%	578	564
11	2.307	6.5	1.978	50.2	5.907	150.0	-9.6	12675.2	691				577	
Average	2.307	6.5	1.981	50.3	5.905	150.0	-9.6							
1	2.240	9.2	1.971	50.1	5.911	150.1	-9.6	11340.9	620				521	
11	2.249	8.8	1.974	50.1	5.916	150.3	-10.3	10988.2	599	599	21.1	3.5%	505	505
19	2.245	9.0	1.970	50.0	5.918	150.3	-9.6	10575.6	577				488	
Average	2.245	9.0	1.972	50.1	5.915	150.2	-9.8							

Table B-21: Instrumented Data @ 21.1°C: Part A

Tensile Strength											
AAASHTO T 322-07											
Specimen No.	Gmb	Voids (%)	Thickness (mm)		Diameter (mm)	Temp (deg C)	P _f (lb)	St _n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)
			(in)	(mm)							
13	2.338	4.0	1.994	50.6	5.897	21.2	3774.6	204	195	9.1	4.7%
20	2.328	4.4	1.994	50.6	5.897	21.0	3682.5	194	195	9.1	4.7%
21	2.349	3.6	1.989	50.5	5.898	20.9	3429.6	186			
Average	2.338	4.0	1.992	50.6	5.897	21.0	3135.9	171	174	166	7.2%
16	2.280	6.4	1.980	50.3	5.909	21.2	3217.6	174	166	11.9	7.2%
19	2.278	6.5	1.995	50.7	5.898	21.2	2790.4	152			
20	2.276	6.6	1.981	50.3	5.900	21.2	2790.4	152			
Average	2.278	6.5	1.985	50.4	5.902	21.2	2513.2	136	140	7.4	5.3%
2	2.209	9.3	2.000	50.8	5.910	21.3	2765.0	149	140	7.4	5.3%
13	2.212	9.2	2.005	50.9	5.903	21.2	2503.9	137			
28	2.223	8.7	1.976	50.2	5.906	21.2					
Average	2.215	9.1	1.994	50.6	5.906	21.2					

Tensile Strength											
AAASHTO T 322-07											
Specimen No.	Gmb	Voids (%)	Thickness (mm)		Diameter (mm)	Temp (deg C)	P _f (lb)	St _n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)
			(in)	(mm)							
2	2.417	3.9	1.977	50.2	5.892	21.4	4389.3	240	225	13.3	5.9%
6	2.413	4.1	1.992	50.6	5.900	21.1	4095.9	222	225	13.3	5.9%
22	2.412	4.1	2.001	50.8	5.902	21.1	3967.8	214			
Average	2.414	4.0	1.990	50.5	5.898	21.2	3952.6	214	226	10.6	4.7%
18	2.361	6.1	1.991	50.6	5.901	21.2	4355.9	234	226	10.6	4.7%
20	2.345	6.8	2.007	51.0	5.903	21.2	4241.4	230			
27	2.353	6.5	1.986	50.4	5.901	21.2	4241.4	230			
Average	2.353	6.5	1.995	50.7	5.902	21.2	3198.3	173	171	11.3	6.6%
2	2.290	8.9	1.991	50.6	5.905	21.2	3336.3	181			
21	2.286	9.1	1.984	50.4	5.909	21.2	2948.6	159			
28	2.286	9.1	1.988	50.7	5.908	21.3					
Average	2.287	9.0	1.991	50.6	5.907	21.2					

Table B-22: Instrumented Data @ 21.1°C: Part B

Specimen No.	Gmb	Voids (%)	Temp (deg C)	Thickness		Diameter		Tensile Strength				Horizontal Deformations (mm)				Failure Strain (microstrain)			
				AAASHTO T 322-07		AAASHTO T 322-07		Pt,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	North	South	Average	North	South	Average	
				(in)	(mm)	(in)	(mm)												North
14	2.318	3.9	21.1	1.996	50.7	5.908	150.1	3081.8	166	158	135	9.0	5.1%	6.1602E-03	6.4012E-03	6.2807E-03	162	168	165
25	2.314	4.1	21.2	1.962	49.8	5.900	149.9	2742.1	151	158	135	9.0	5.1%	6.8786E-03	9.7883E-03	8.3334E-03	181	258	219
26	2.308	4.3	21.3	1.918	48.7	5.902	149.9	2766.9	156	158	135	9.0	5.1%	5.7384E-03	9.0386E-03	7.3691E-03	151	238	194
Average	2.313	4.1	21.2	1.959	49.8	5.903	149.9	2766.9	156	158	135	9.0	5.1%	Average	Average	Average	151	238	194
10	2.262	6.2	21.2	2.000	50.8	5.902	149.9	2342.7	126	130	130	6.1	6.7%	1.0887E-02	1.1707E-02	1.1297E-02	286	308	297
19	2.245	6.9	21.3	1.976	50.2	5.915	150.2	2456.5	134	130	130	6.1	6.7%	7.0332E-03	7.5513E-03	7.2923E-03	185	199	192
29	2.261	6.3	21.0	1.993	50.6	5.911	150.1	2670.7	144	130	130	6.1	6.7%	6.3868E-03	8.1031E-03	7.2450E-03	168	213	191
Average	2.256	6.5	21.2	1.990	50.5	5.909	150.1	2670.7	144	130	130	6.1	6.7%	Average	Average	Average	168	213	191
5	2.186	9.4	21.3	1.991	50.6	5.919	150.3	2539.2	137	130	130	6.1	4.7%	3.0320E-03	6.6704E-03	4.8512E-03	80	176	128
16	2.195	9.0	21.3	2.002	50.9	5.913	150.2	2329.4	125	130	130	6.1	4.7%	1.0888E-02	7.4115E-03	9.1497E-03	287	195	241
28	2.206	8.6	21.1	1.990	50.5	5.909	150.1	2380.9	129	130	130	6.1	4.7%	7.4711E-03	5.6799E-03	6.6756E-03	197	149	173
Average	2.196	9.0	21.2	1.994	50.7	5.914	150.2	2380.9	129	130	130	6.1	4.7%	Average	Average	Average	197	149	173

Specimen No.	Gmb	Voids (%)	Temp (deg C)	Thickness		Diameter		Tensile Strength				Horizontal Deformations (mm)				Failure Strain (microstrain)			
				AAASHTO T 322-07		AAASHTO T 322-07		Pt,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	North	South	Average	North	South	Average	
				(in)	(mm)	(in)	(mm)												North
7	2.365	4.1	21.3	1.998	50.7	5.901	149.9	3314.9	179	184	153	1.9	2.7%	6.0567E-03	8.8484E-03	7.4526E-03	159	233	196
14	2.365	4.1	21.3	1.978	50.2	5.900	149.9	3366.5	184	184	153	1.9	2.7%	5.9546E-03	8.0853E-03	7.0199E-03	157	213	185
17	2.368	4.0	21.3	1.981	50.3	5.902	149.9	3470.5	189	184	153	1.9	2.7%	6.8051E-03	5.0729E-03	5.9390E-03	179	133	156
Average	2.366	4.1	21.3	1.986	50.4	5.901	149.9	3470.5	189	184	153	1.9	2.7%	Average	Average	Average	179	133	156
23	2.300	6.8	21.5	1.993	50.6	5.906	150.0	2800.4	151	153	153	1.9	1.2%	7.3935E-03	1.0033E-02	8.7131E-03	195	264	229
8	2.299	6.8	21.4	1.993	50.6	5.904	150.0	2868.6	155	153	153	1.9	1.2%	8.0818E-03	9.1102E-03	8.5960E-03	213	240	226
21	2.302	6.7	21.4	1.968	50.5	5.904	150.0	2835.1	154	153	153	1.9	1.2%	6.7169E-03	1.0757E-02	8.7367E-03	177	283	230
Average	2.300	6.8	21.4	1.991	50.6	5.905	150.0	2835.1	154	153	153	1.9	1.2%	Average	Average	Average	177	283	230
18	2.245	9.0	21.2	1.975	50.2	5.913	150.2	2457.1	134	132	132	5.7	4.3%	5.5853E-03	1.1797E-02	8.6911E-03	147	310	229
25	2.247	8.9	21.5	1.991	50.6	5.923	150.4	2322.1	125	132	132	5.7	4.3%	8.5425E-03	1.3138E-02	1.0840E-02	225	346	285
24	2.241	9.2	21.3	1.986	50.4	5.922	150.4	2513.8	136	132	132	5.7	4.3%	8.5356E-03	1.3036E-02	1.0786E-02	225	343	284
Average	2.244	9.0	21.3	1.984	50.4	5.919	150.4	2513.8	136	132	132	5.7	4.3%	Average	Average	Average	225	343	284

Table B-23: Instrumented Data @ 4.4°C: Part A

Specimen No.	Gmb	Voids (%)	Thickness		Temp (deg C)	Tensile Strength AASHTO T 322-07			Horizontal Deformations (mm)			Failure Strain (microstrain)						
			(in)	(mm)		Pf,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	North	South	Average	North	South	Average		
																	(in)	(mm)
6	2.330	4.3	1.989	50.5	149.7	4.7	8119.5	441	460	18.8	4.1%	2.2650E-03	1.6101E-03	1.9376E-03	60	42	51	
8	2.346	3.7	2.004	50.9	149.9	4.7	8655.3	461	460	18.8	4.1%	3.0128E-03	1.7412E-03	2.3770E-03	79	46	63	
24	2.339	4.0	1.997	50.7	149.9	4.7	8855.0	478				3.9349E-03	1.8839E-03	2.9094E-03	104	50	77	
Average	2.338	4.0	1.997	50.7	149.8	4.7						Average	2.4080E-03					63
2	2.276	6.6	1.986	50.4	150.0	4.6	7418.0	403				3.4384E-03	1.2129E-03	2.3257E-03	90	32	61	
9	2.281	6.4	1.994	50.6	149.9	4.7	7571.4	410	419	23.2	5.5%	1.1101E-03	2.4821E-03	1.7961E-03	29	65	47	
18	2.277	6.5	1.973	50.1	149.7	4.7	8145.8	446				1.4662E-03	2.6228E-03	2.0445E-03	39	69	54	
Average	2.278	6.5	1.984	50.4	149.9	4.7						Average	2.0554E-03					54
1	2.209	9.3	2.001	50.8	149.9	4.7	6376.5	344	341	3.0	0.9%	1.9550E-03	3.2763E-03	2.6166E-03	51	86	69	
23	2.216	9.0	1.988	50.5	150.0	4.6	6275.0	340				1.4100E-03	3.9655E-03	2.6878E-03	37	104	71	
25	2.223	8.8	1.995	50.7	150.1	4.7	6255.1	338				2.9748E-03	1.3945E-03	2.1846E-03	78	37	57	
Average	2.216	9.0	1.995	50.7	150.0	4.7						Average	2.4963E-03					66

Specimen No.	Gmb	Voids (%)	Thickness		Temp (deg C)	Tensile Strength AASHTO T 322-07			Horizontal Deformations (mm)			Failure Strain (microstrain)						
			(in)	(mm)		Pf,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	North	South	Average	North	South	Average		
																	(in)	(mm)
18	2.410	4.2	1.995	50.7	149.9	4.5	10548.7	571	543	27.0	5.0%	2.0025E-03	2.0213E-03	2.0119E-03	53	53	53	
20	2.413	4.0	2.006	51.0	149.7	4.7	9696.3	517	543	27.0	5.0%	4.0944E-03	1.6964E-03	2.8964E-03	108	45	76	
23	2.419	3.8	1.975	50.2	149.8	4.6	9908.4	542				8.3754E-04	4.9787E-03	2.9081E-03	22	131	77	
Average	2.414	4.0	1.992	50.6	149.8	4.6						Average	2.6051E-03					69
1	2.350	6.6	1.986	50.4	149.9	4.7	9028.9	490	492	22.6	4.6%	1.0861E-03	4.5516E-03	2.8188E-03	29	120	74	
14	2.369	6.2	1.996	50.7	150.0	4.7	9528.2	515	492	22.6	4.6%	3.0026E-03	2.5218E-03	2.7622E-03	79	66	73	
25	2.351	6.5	2.003	50.9	149.9	4.7	8716.4	470				5.3766E-04	2.9275E-03	1.7326E-03	14	77	46	
Average	2.353	6.4	1.995	50.7	149.9	4.7						Average	2.4379E-03					64
7	2.289	9.0	1.978	50.2	149.9	4.6	7828.2	427	401	28.5	7.1%	1.8130E-03	1.8972E-03	1.7551E-03	48	45	46	
22	2.291	8.9	1.999	50.8	150.0	4.9	7547.2	407				1.1722E-03	2.9698E-03	2.0710E-03	31	78	54	
25	2.287	9.1	2.002	50.9	149.7	4.9	6871.1	371				7.0913E-04	3.4605E-03	2.0848E-03	19	91	55	
Average	2.289	9.0	1.993	50.6	149.9	4.8						Average	1.9703E-03					52

Table B-24: Instrumented Data @ 4.4°C: Part B

Specimen No.	Gmb	Voids (%)	Thickness		Diameter (mm)	Temp (deg C)	Tensile Strength AASHTO T 322-07			Horizontal Deformations (mm)			Failure Strain (microstrain)					
			(in)	(mm)			Pf,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	North	South	Average	North	South	Average	
																		(in)
6	2,319	3.9	1.982	50.3	5,903	4.3	8466.2	461	465	5.8	1.2%	1.5565E-03	2.6032E-03	2.0809E-03	41	69	55	
10	2,312	4.1	2.085	53.0	5,905	4.6	8970.3	464	465	5.8	1.2%	1.8730E-03	1.4787E-03	1.6758E-03	49	39	44	
13	2,308	4.3	2.015	51.2	5,906	4.6	8620.8	472	465	5.8	1.2%	2.4177E-03	1.7993E-03	2.1085E-03	64	47	55	
Average	2,313	4.1	2.027	51.5	5,905	4.5						Average	1.9551E-03					51
13	2,248	6.8	1.966	50.4	5,907	4.6	7068.2	384	360	18.0	4.7%	8.7816E-04	3.5948E-03	2.2365E-03	23	95	59	
26	2,259	6.3	2.009	51.0	5,906	4.6	6719.7	361	360	18.0	4.7%	1.1535E-03	2.4524E-03	1.8029E-03	30	65	47	
28	2,263	6.2	1.989	50.5	5,904	4.6	7304.1	396	360	18.0	4.7%	2.5214E-03	8.4765E-04	1.6845E-03	66	22	44	
Average	2,257	6.4	1.995	50.7	5,906	4.6						Average	1.9080E-03					50
9	2,190	9.2	1.997	50.7	5,918	4.3	6147.1	331	336	3.9	1.2%	2.0454E-03	1.6390E-03	1.8422E-03	54	43	48	
11	2,194	9.0	1.993	50.6	5,915	4.4	6276.8	339	336	3.9	1.2%	2.0037E-03	1.5196E-03	1.7616E-03	53	40	46	
20	2,203	8.7	1.994	50.6	5,911	4.6	6214.6	336	336	3.9	1.2%	2.4821E-03	1.2316E-03	1.8569E-03	65	32	49	
Average	2,196	9.0	1.995	50.7	5,915	4.4						Average	1.6202E-03					48

Specimen No.	Gmb	Voids (%)	Thickness		Diameter (mm)	Temp (deg C)	Tensile Strength AASHTO T 322-07			Horizontal Deformations (mm)			Failure Strain (microstrain)					
			(in)	(mm)			Pf,n (lbf)	St,n (psi)	Avg. St (psi)	St SD (psi)	St CV (%)	North	South	Average	North	South	Average	
																		(in)
4	2,365	4.1	1.981	50.3	5,900	4.4	9078.4	494	520	21.9	4.2%	1.5633E-03	4.2285E-03	2.8959E-03	41	111	76	
19	2,367	4.1	1.994	50.6	5,899	4.6	9788.8	530	520	21.9	4.2%	2.4197E-03	3.9886E-03	3.2041E-03	64	105	84	
20	2,370	4.0	1.967	50.0	5,897	4.7	9741.2	535	520	21.9	4.2%	1.6263E-03	5.5593E-03	3.5928E-03	43	146	95	
Average	2,367	4.1	1.981	50.3	5,899	4.6						Average	3.2309E-03					85
2	2,299	6.8	1.978	50.2	5,904	4.7	8182.4	446	438	16.5	3.8%	1.2578E-03	3.9871E-03	2.6224E-03	33	105	69	
7	2,298	6.8	1.973	50.1	5,913	4.7	7669.9	419	438	16.5	3.8%	3.2145E-03	1.6358E-03	2.4252E-03	85	43	64	
12	2,296	6.9	1.984	50.4	5,904	4.8	8243.4	448	438	16.5	3.8%	1.2256E-03	2.6478E-03	1.9367E-03	32	70	51	
Average	2,298	6.8	1.978	50.2	5,907	4.7						Average	2.3281E-03					61
8	2,237	9.3	1.966	49.7	5,915	4.4	6873.0	378	368	17.0	4.4%	2.6945E-03	1.7789E-03	2.2357E-03	71	47	59	
9	2,244	9.1	1.991	50.6	5,908	4.7	7528.1	407	368	17.0	4.4%	2.4755E-03	1.4490E-03	1.9622E-03	65	38	52	
13	2,252	8.7	1.979	50.3	5,909	4.7	6941.6	378	368	17.0	4.4%	3.3920E-03	1.3244E-03	2.3582E-03	89	35	62	
Average	2,244	9.0	1.975	50.2	5,911	4.6						Average	2.1854E-03					58

Table B-25: Instrumented Data @ -10°C: 07-123 & 06-105

Mix Designation		07-123		%RAP		20.0												
Mix Type		BP1		RAP %AC		5.7												
Virgin Binder Grade		PG64-22		Total %AC		5.3												
%Virgin AC		4.2		%Fibers		0.0												
Gmm		2.501																
Specimen No.	Gmb	Voids (%)	Thickness		Diameter	Temp (deg C)	Tensile Strength											
			(in)	(mm)			AASHTO T 322-07		NCHRP 530 Correction		AASHTO T 322-03							
16	2.331	6.8	1.995	50.7	5.901	149.9	640	537	505	594	59.6	10.0%						
17	2.333	6.7	1.997	50.7	5.901	149.9	542	460	505	527	59.6	10.0%						
18	2.331	6.8	1.983	50.4	5.905	150.0	617	519	505	527	59.6	10.0%						
Average	2.332	6.8	1.992	50.6	5.902	149.9												
Specimen No.	Gmb	Voids (%)	Thickness		Diameter	Temp (deg C)	Horizontal Deformations (mm)				Failure Strain (microstrain)							
			(in)	(mm)			At (Y - X) peak		At Maximum Load		At (Y - X) peak		At Maximum Load		At (Y - X) peak			
16	2.331	6.8	1.995	50.7	5.901	149.9	5.8338E-04	5.6673E-04	5.8338E-04	5.6673E-04	5.8338E-04	5.6673E-04	15	14	15	14	15	
17	2.333	6.7	1.997	50.7	5.901	149.9	6.9512E-04	4.3674E-04	6.9512E-04	4.3674E-04	6.9512E-04	4.3674E-04	18	5	11	18	6	
18	2.331	6.8	1.983	50.4	5.905	150.0	2.1927E-04	4.0067E-04	2.1927E-04	4.0067E-04	2.1927E-04	4.0067E-04	6	15	11	6	15	
Average	2.332	6.8	1.992	50.6	5.902	149.9							Average			Average		
Specimen No.	Gmb	Voids (%)	Thickness		Diameter	Temp (deg C)	Tensile Strength				Failure Strain (microstrain)							
			(in)	(mm)			AASHTO T 322-07		NCHRP 530 Correction		AASHTO T 322-03		At (Y - X) peak		At Maximum Load			
3	2.306	6.1	1.73	43.9	5.92	150.4	9639.5	612	515	483	0	0	0	0	0	0	0	
8	2.282	7.0	1.72	43.7	5.91	150.1	8791.5	551	571	483	487	483	0	0	0	0	0	
9	2.297	6.4	1.73	43.9	5.92	150.4	8860.5	551	551	483	488	483	0	0	0	0	0	
Average	2.295	6.5	1.73	43.9	5.92	150.3												
Specimen No.	Gmb	Voids (%)	Thickness		Diameter	Temp (deg C)	Horizontal Deformations (mm)				Failure Strain (microstrain)							
			(in)	(mm)			At (Y - X) peak		At Maximum Load		At (Y - X) peak		At Maximum Load					
3	2.306	6.1	1.73	43.9	5.92	150.4	8.1733E-04	7.7491E-04	8.1733E-04	7.7491E-04	8.1733E-04	7.7491E-04	22	20	21			
8	2.282	7.0	1.72	43.7	5.91	150.1	3.8602E-04	5.6931E-04	3.8602E-04	5.6931E-04	3.8602E-04	5.6931E-04	10	15	13			
9	2.297	6.4	1.73	43.9	5.92	150.4	6.6730E-05	1.3777E-03	6.6730E-05	1.3777E-03	6.6730E-05	1.3777E-03	2	36	19			
Average	2.295	6.5	1.73	43.9	5.92	150.3							Average			Average		

indicates an instance of first failure
Ending horizontal deformation taken as the reading on the same line as maximum difference between vertical and horizontal deformation

Table B-26: Instrumented Data @ -10°C: 06-84

Specimen No.	Gmb	Voids (%)	Thickness		Temp (deg C)	Tensile Strength											
			(in)	(mm)		AASHTO T 322-07		NCHRP 530 Correction		AASHTO T 322-03							
						Pf,n (lb)	St,n (psi)	Avg St (psi)	St CV (%)	Pf,n (lb)	St,n (psi)	Avg St (psi)	St CV (%)				
4	2.340	4.0	1.979	50.3	5.898	149.8	-10.0	12406.6	577	697	19.2	2.8%	566	0	0	0.0	#DIV/0!
7	2.336	4.1	2.000	50.8	5.897	149.8	-10.0	13244.0	715	699			596	0	0	0.0	#DIV/0!
23	2.337	4.1	1.956	49.7	5.899	149.8	-10.0	12865.4	699				583	0	0	0.0	#DIV/0!
Average	2.338	4.1	1.978	50.2	5.898	149.8	-10.0										
12	2.274	6.7	1.995	50.7	5.912	150.2	-10.0	12029.4	649	618	46.7	7.6%	544	0	0	0.0	#DIV/0!
15	2.278	6.5	1.999	50.8	5.899	149.8	-10.1	10446.8	564				478	0	0	0.0	#DIV/0!
23	2.282	6.3	1.988	50.5	5.899	149.8	-10.0	11782.8	640				537	0	0	0.0	#DIV/0!
Average	2.278	6.5	1.994	50.6	5.903	149.9	-10.0										
11	2.211	9.2	1.994	50.6	5.906	150.0	-10.2	9998.2	540	551	58.0	10.5%	460	0	0	0.0	#DIV/0!
26	2.217	9.0	1.983	50.4	5.905	150.0	-9.7	9164.4	498				427	0	0	0.0	#DIV/0!
27	2.223	8.8	1.997	50.7	5.905	150.0	-9.9	11355.0	613				516	0	0	0.0	#DIV/0!
Average	2.217	9.0	1.991	50.6	5.905	150.0	-9.9										

Specimen No.	Gmb	Voids (%)	Thickness		Temp (deg C)	Horizontal Deformations (mm)				Failure Strain (microstrain)							
			(in)	(mm)		At Maximum Load		At (Y-X) peak		At Maximum Load		At (Y-X) peak					
						North	South	North	South	North	South	North	South				
4	2.340	4.0	1.979	50.3	5.898	149.8	-10.0	5.6494E-04	9.0663E-04	7.3578E-04	15	24	19				
7	2.336	4.1	2.000	50.8	5.897	149.8	-10.0	5.0361E-04	6.7086E-04	5.8724E-04	13	18	15				
23	2.337	4.1	1.956	49.7	5.899	149.8	-10.0	3.2247E-04	1.0770E-03	6.9973E-04	8	28	18				
Average	2.338	4.1	1.978	50.2	5.898	149.8	-10.0	Average	Average	Average	Average	Average	Average	Average	Average	Average	Average
12	2.274	6.7	1.995	50.7	5.912	150.2	-10.0	1.5408E-03	4.9095E-04	1.0159E-03	41	13	27				
15	2.278	6.5	1.999	50.8	5.899	149.8	-10.1	6.2882E-04	8.5322E-04	7.4102E-04	17	22	20				
23	2.282	6.3	1.988	50.5	5.899	149.8	-10.0	3.0918E-04	2.2304E-03	1.2898E-03	8	59	33				
Average	2.278	6.5	1.994	50.6	5.903	149.9	-10.0	Average	Average	Average	Average	Average	Average	Average	Average	Average	Average
11	2.211	9.2	1.994	50.6	5.906	150.0	-10.2	1.1227E-03	5.0068E-04	8.1171E-04	30	13	21				
26	2.217	9.0	1.983	50.4	5.905	150.0	-9.7	9.9439E-04	6.3455E-04	8.1447E-04	26	17	21				
27	2.223	8.8	1.997	50.7	5.905	150.0	-9.9	4.3575E-04	1.7759E-03	1.1056E-03	11	47	29				
Average	2.217	9.0	1.991	50.6	5.905	150.0	-9.9	Average	Average	Average	Average	Average	Average	Average	Average	Average	Average

Indicates an instance of first failure

Ending horizontal deformation taken as the reading on the same line as the maximum difference between vertical and horizontal deformation

Table B-27: Instrumented Data @ -10°C: 06-101

Specimen No.	Gmb	Voids (%)	Thickness		Temp (deg C)	Tensile Strength														
			AASHTO T 322-07			NCHRP 530 Correction														
			Pf,n (lb)	St,n (psi)		Avg, St (psi)	St, n (psi)	St, CV (%)	Avg, St (psi)	Pf,n (lb)	St,n (psi)	St, CV (%)								
1	2.421	3.8	1.993	50.6	5.884	149.7	-9.9	790	655	0	0	0	0.0	#DIV/0!						
3	2.409	4.2	2.001	50.8	5.898	149.8	-9.8	14113.2	632	641	0	0	0	#DIV/0!						
13	2.414	4.0	2.000	50.8	5.896	149.8	-9.9	14212.0	636	641	0	0	0	#DIV/0!						
Average	2.415	4.0	1.998	50.7	5.896	149.8	-9.9													
8	2.347	6.7	2.007	51.0	5.906	150.0	-10.3	11481.9	617	10792.8	560	519	3.0%	39.7	6.4%					
16	2.360	6.5	2.000	50.8	5.906	150.0	-10.0	11903.1	642	536	11903.1	538	625	39.7	6.4%					
26	2.368	6.2	2.002	50.9	5.896	149.8	-9.9	12119.8	654	548	12119.8	548	654							
Average	2.352	6.5	2.003	50.9	5.903	149.9	-10.1													
8	2.289	9.0	1.993	50.6	5.904	150.0	-10.0	10875.9	588	497	0	497	0	0	#DIV/0!					
11	2.283	9.2	1.977	50.2	5.897	149.8	-10.0	10505.4	574	485	0	485	0	0	#DIV/0!					
26	2.293	8.8	1.987	50.5	5.903	149.9	-9.9	10282.0	558	473	0	473	0	0	#DIV/0!					
Average	2.288	9.0	1.986	50.4	5.901	149.9	-10.0													
Specimen No.	Gmb	Voids (%)	Thickness		Temp (deg C)	Horizontal Deformations (mm)						Failure Strain (microstrain)								
			At Maximum Load			At (Y-X) peak			At Maximum Load			At (Y-X) peak								
			North	South		Average	North	South	Average	North	South	Average	North	South	Average	North	South	Average		
1	2.421	3.8	1.993	50.6	5.884	149.7	-9.9	3.6580E-04	6.6074E-04	5.1327E-04	1.5470E-04	1.9705E-03	1.0626E-03	1	52	26	4	52	28	
3	2.409	4.2	2.001	50.8	5.898	149.8	-9.8	3.3648E-04	9.4584E-04	6.4116E-04	4.2096E-04	6.1440E-04	5.1768E-04	11	16	14	11	16	14	
13	2.414	4.0	2.000	50.8	5.896	149.8	-9.9	2.0830E-04	1.1824E-03	6.9534E-04	2.5428E-04	6.3165E-04	4.4297E-04	7	17	12	7	17	12	
Average	2.415	4.0	1.998	50.7	5.896	149.8	-9.9													
8	2.347	6.7	2.007	51.0	5.906	150.0	-10.3	2.3756E-05	1.9705E-03	9.9712E-04	1.5470E-04	1.9705E-03	1.0626E-03	1	52	26	4	52	28	
16	2.360	6.5	2.000	50.8	5.906	150.0	-10.0	4.2096E-04	6.1440E-04	5.1768E-04	4.2096E-04	6.1440E-04	5.1768E-04	11	16	14	11	16	14	
26	2.368	6.2	2.002	50.9	5.896	149.8	-9.9	2.5428E-04	6.3165E-04	4.4297E-04	2.5428E-04	6.3165E-04	4.4297E-04	7	17	12	7	17	12	
Average	2.352	6.5	2.003	50.9	5.903	149.9	-10.1													
8	2.289	9.0	1.993	50.6	5.904	150.0	-10.0	1.1259E-03	2.9866E-04	7.1238E-04	6.7441E-04	6.7441E-04	6.7441E-04	30	8	19				
11	2.283	9.2	1.977	50.2	5.897	149.8	-10.0	4.1363E-04	1.4178E-03	9.1571E-04				11	37	24				
26	2.293	8.8	1.987	50.5	5.903	149.9	-9.9	8.3473E-04	8.5893E-04	8.4689E-04				22	23	22				
Average	2.288	9.0	1.986	50.4	5.901	149.9	-10.0													

Indicates an instance of first failure

Ending horizontal deformation taken as the reading on the same line as maximum difference between vertical and horizontal deformation



Missouri Department of Transportation
Organizational Results
P. O. Box 270
Jefferson City, MO 65102

573.526.4335
1 888 ASK MODOT
innovation@modot.mo.gov