Project 0-6658

Lab Tests: Asphalt-Binders, HMA, Base, & Soils

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Tests, Time, & Materials: Binders

Test	Spec	Parameter	Reps	Time (Hrs)		AMNT of Binder Required	AMNT of Plant-Mix Required to do Extraction
				Sample Prep	Testing		
1) Specific Gravity	T 228	Specific gravity	~~3~~ (1)			40	2000
2) Viscosity	T 316	Viscosity	~~3~~ (1)			40	2000
3) DSR: Original	T 315	Tru Grade and G*, G*/Sin(δ)	~~3~~ (1)			30	1500
4) DSR: RTFO	T 240	Tru Grade and G*, G*/Sin(δ)	~~3~~ (1)	4	3	30	1500
5) DSR: PAV	R 28	G*and G*/Sin(δ)	~~3~~ (1)	24	3	30	1500
6) RTFO-MSCR	TP 70	R100,R3200, R_{diff},J_{nr}3200, $J_{nr\text{-}diff}$	9	4	6	60	3000
7) BBR	T 313 R28	Stiffness, m-value	~~6~~ (2)	26	4	120	7000
8) Elastic recovery	(D 6084-A)	Elastic recovery	3	8	2	100	6000
9) PG grading	M 320, Item 300, MP 19	PG Grade	-	-	-	-	-
			Total	71	24		24500 gm (~ 63 lbs)

Note that the reduction in the number of replicates was made by TxDOT/PD

Tests, Time, & Materials: HMA Mixes

Test	Spec	Parameter	Reps	Time (Hrs)		AMNT of Mat Required to Mold Samples
				Sample Prep* (minus batching/mixing)	Testing	
1) AC extraction	Tex-210-F	Binder % (by weight)	3			5000
~~2) AC extraction~~	~~Tex-236-F~~		~~3~~			~~5000~~
3) Gradation	Tex-200-F	Particle Size Distribution	3			(Aggregates from Tex-210-F)
4) Hamburg	Tex-242-F	Rut Depth, Number of wheel passes	~~3~~ (1)	24	14	20000
5) Overlay Test (OT)	Tex-248-F	Max Load, No. of cycles to failure	5	72	36	25000
6) OT fracture properties, A & n	Report 0-5798-2, PP 97 (DM + OT)	A & n	5	80	14	25000
7) Dynamic modulus (DM)	AASHTO TP 62-03	Dynamic modulus	3	72	120	22000
8) RLPD – permanent def.	Report 0-5798 (New)	α, μ ,and microstrains	6	72	27	45000
9) Indirect-tension (IDT)	Tex-226-F	Load, strength, strain, fracture energy	3	72	2	15000
10) Thermal coefficient	Tex-428-A	Thermal coefficient	3	72	36	22000
			Total	482 hours (482+ 84)	271 hours	184000 gm (~ 405 lbs)

Note that the reduction in the number of replicates was made by TxDOT/PD

Tests, Time, & Materials: Flex Base

Step/Test	Spec	Parameter	Reps	Time*		AMNT of Material Required
				Sample Prep	Testing	
1) Sieve Analysis [a,b]	Tex-110-E	Gradation	Stock	1 hrs (24 hrs)	8 hrs	700 lbs[c]
2) Atterberg Limits[a]	Tex-104-E,105-E,106-E	PI, LL, PL	2[d]	1 hrs (12 hrs)	2 hrs	3 lbs
3) Specific Gravity	ASTM C-127, 128	SG value	2[d]	1 hrs (19 hrs)	1 hrs (12 hrs)	12 lbs
4) Wet Ball Mill[a,e]	Tex-116-E	Wet Ball Mill value	2[d]	1 hrs (2hrs)	3hrs (24 hrs)	22 lbs
5) MD Curve[a]	Tex-113-E	MDD, OMC	2[d]	1 hrs (4-12hrs)	2 hrs	160 lbs
6) Texas Triaxial	Tex-117-E	Classification, C and ϕ	2[d]	5 hrs (10 days)	4 hrs	240 lbs
7) Resilient Modulus	Tech Memo (1-28A)	k- parameters	2[d]	1 hrs (24 hrs)	10 hrs	70 lbs
8) Permanent Deformation	Tech Memo (1-28A)	α and μ	2[d]	1 hrs (24 hrs)	10 hrs	70 lbs
9) Shear Strength	Tex-143	C and ϕ	2[d]	1 hrs (24 hrs)	4 hrs	120 lbs

***** - Time in parenthesis refers to wait(cure) time, **a** - Perform sieve analysis and compare gradation to TXDOT. If gradation matches then use TXDOT QC data, otherwise run test, **b** - Include sieves #100 and #200, **c** - This represents the minimum total amount of material sampled from the field and used in Steps 2-9, **d** - A third test is performed if the duplicate results vary with a wide margin, **e** - If available use from TXDOT QC

Tests, Time, & Materials: Treated Base

Step/Test	Spec	Parameter	Reps	Time*		AMNT of Material Required
				Sample Prep	Testing	
1) Sieve Analysis[a,b]	Tex-110-E	Gradation	Stock	1 hr (24hrs)	8 hrs	550 lbs[c]
2) Atterberg Limit[d, e]	Tex-104-E,105-E,106-E	PI, LL, PL	2[f]	1 hrs (12 hrs)	2 hrs	6 lbs
3) Sulfate Content[d]	Tex-145-E	Sulfate Content	2[f]	1 hrs (12 hrs)	2 hrs	1 lbs
4) Organic Content[d]	Tex-408-A	Organic Content	2[f]	1 hrs (24 hrs)	2 hrs	1 lbs
5) Wet Ball Mill[d]	Tex-116-E	Wet Ball Mill value	2[f]	1 hrs (2hrs)	3hrs (24 hrs)	22 lbs
6) MD Curve[e]	Tex-113-E	MDD, OMC	2[f]	1 hrs (4-12hrs)	2 hrs	160 lbs
7) Unconfined Comp. Strength[e]	Tex-120-E etc	UCS	2[f]	1 hrs (7 days)	1 hrs	40 lbs
8) Resilient Modulus[e, i]	Zero confinement	k- parameters	2[f]	1 hrs (7 days)	2 hrs	70 lbs
9) Permanent Deformation[e,g]	Zero confinement	α and μ	2[f]	1 hrs (7 days)	10 hrs	70 lbs
10) Modulus of Rupture[e,h]	Tex-448-A	Modulus of Rupture	2[f]	6 hrs (7 days)	1 hrs	140 lbs

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Tests, Time, & Materials: Raw Subgrade Soil

Step/Test	Spec	Parameter	Reps	Time*		AMNT of Material Required
				Sample Prep	Testing	
1) Sieve Analysis[a,b]	Tex-110-E	Gradation	Stock	1 hr (24 hrs)	8 hrs	310 lbs[c]
2) Atterberg Limits	Tex-104-E,105-E,106-E	PI, LL, PL	2[d]	1 hrs (12 hrs)	2 hrs	3 lbs
3) Specific Gravity	Tex-108-E	SG value	2[d]	1 hrs (19 hrs)	1 hrs (12 hrs)	1 lbs
4) Sulfate Content	Tex-145-E	Sulfate Content	2[d]	1 hrs (12 hrs)	2 hrs	1 lbs
5) Organic Content	Tex-408-A	Organic Content	2[d]	1 hrs (24 hrs)	2 hrs	1 lbs
6) MD Curve	Tex-114-E	MDD, OMC	2[d]	1 hrs (4-12hrs)	2 hrs	80 lbs
7) Texas Triaxial	Tex-117-E	Classification, C and ϕ	2[d]	1 hrs (10 days)	6 hrs	120 lbs
8) Resilient Modulus	Tech Memo (1-28A)	k- parameters	2[d]	1 hrs (24 hrs)	10 hrs	20 lbs
9) Permanent Deformation	Tech Memo (1-28A)	α and μ	2[d]	1 hrs (24 hrs)	10 hrs	20 lbs
10) Shear Strength	Tex-143	C and ϕ	2[d]	1 hrs (24 hrs)	8 hrs	60 lbs

***** - Time in parenthesis refers to wait(cure) time, **a** - Perform sieve analysis and compare gradation to TXDOT. If gradation matches then use TXDOT QC data, otherwise run test, **b** - Include sieves #100 and #200, **c** - This represents the minimum total amount of material sampled from the field and used in Tests 2-10, **d** - A third test is performed if the duplicate results vary with a wide margin

Tests, Time, & Materials: Treated Subgrade Soil

Step/Test	Spec	Parameter	Reps	Time*		AMNT of Material Required
				Sample Prep	Testing	
1) Gradation[a,b]	Tex-110-E	Gradation	Stock	1 hr (24 hrs)	8 hrs	150 lbs[c]
2) Atterberg Limit[d,e]	Tex-104-E,105-E,106-E	PI, LL, PL	2[f]	1 hrs (12 hrs)	2 hrs	6 lbs
3) Sulfate Content[e]	Tex-145-E	Sulfate Content	2[f]	1 hrs (12 hrs)	2 hrs	1 lbs
4) Organic Content[e]	Tex-408-A	Organic Content	2[f]	1 hrs (24 hrs)	2 hrs	1 lbs
5) MD Curve[e]	Tex-114-E	MDD, OMC	2[f]	1 hrs (4-12hrs)	2 hrs	80 lbs
6) Unconfined Comp. Strength[e]	Tex-121-E etc	UCS	2[f]	1 hrs (7 days)	1 hrs	20 lbs
7) Resilient Modulus[e,g]	Zero confinement	k- parameters	2[f]	1 hrs (7 days)	2 hrs	20 lbs
8) Permanent Deformation[e]	Zero confinement	α and μ	2[f]	1 hrs (7 days)	10 hrs	20 lbs

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