

Engineered Emulsion for tack/bond coat and fog/ mastic seal

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Engineered Emulsions

- ▶ Engineered emulsions are designed to address performance challenges faced when utilizing specification emulsions.
 - ▶ Tracking
 - ▶ De-bonding
 - ▶ HMA compaction
 - ▶ Loss of coating
 - ▶ Loss of skid resistance

Specification Tack Coat

- ▶ Specification tack coats are asphalt emulsions that conform to a wide specification range and have been the the industry standard over many years.

Specification CSS-1H

CSS-1H	Test Method	Specification	
		MIN	MAX
Tests on Emulsion:			
Saybolt Viscosity @ 25°C (77°F), SFS	AASHTO T 59	20	100
Storage Stability ¹ , % (1 day)	AASHTO T 59	-	1.0
Sieve Test, %	AASHTO T 59	-	0.10
Cement Mixing Test, %	AASHTO T 59	-	2.0
Particle Charge Test	AASHTO T 59	Positive	-
Distillation ² to 260°C (500°F) Oil distillate % (by volume of emulsion)	AASHTO T 59	-	3.0
Residue, % (by weight)	AASHTO T 59	57.0	-
Tests on Residue by Distillation:			
Penetration @ 25°C, (77°F), 100g, 5s dmm	AASHTO T 49	40	90
Ductility @ 25°C, (77°F), 5.0cm/min, cm	AASHTO T 51	40	-
Solubility in TCE, %	AASHTO T 44	97.5	-

CSS-1H - Tracking



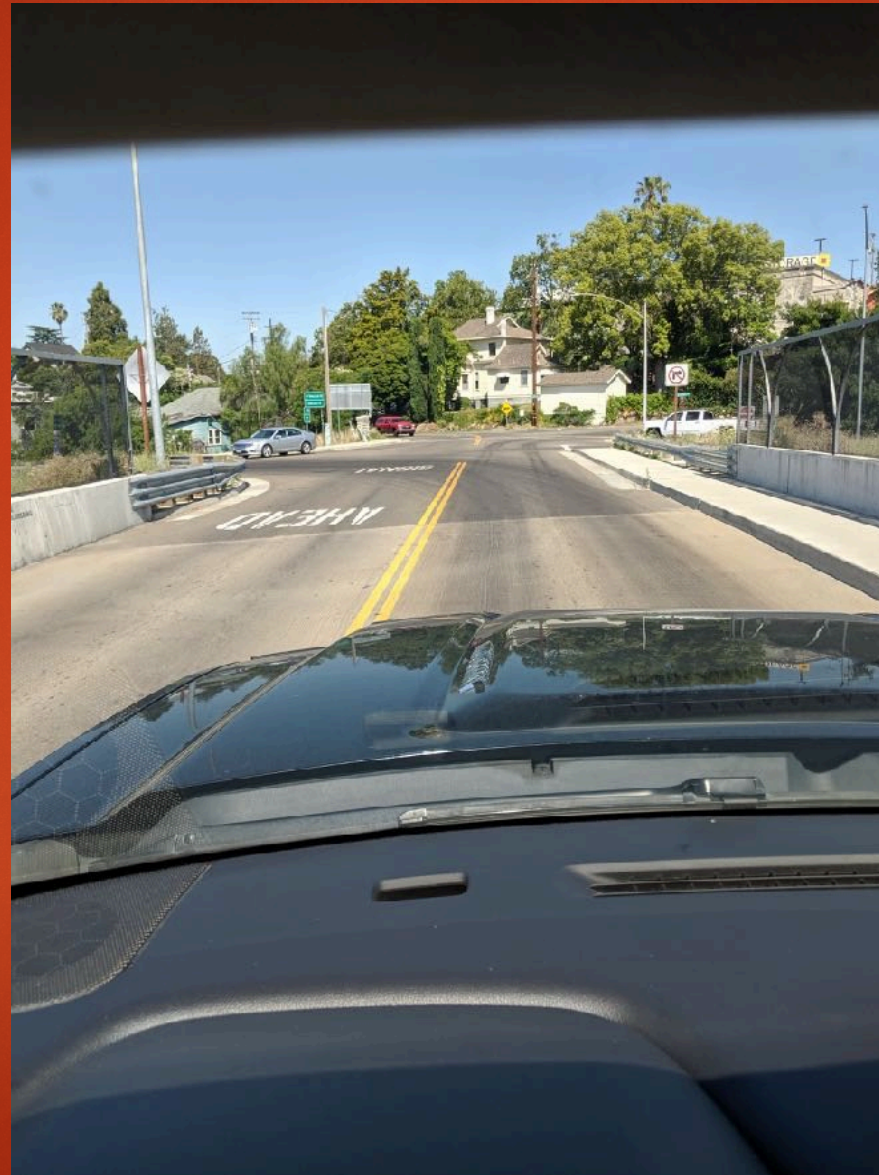
CSS-1H - Tracking



CSS-1H - Tracking



CSS-1H - Tracking



CSS-1H - De-bonding in wheel path



CSS-1H - De-bonding in wheel path



CSS-1H - HMA creep during compaction



ODOT High-Performance Tack Coats (HPTC)

- ▶ In 2015 Oregon Department of Transportation initiated the HPTC study. Working in conjunction with Oregon State University and interested asphalt suppliers, ODOT challenged the idea that engineered emulsions could provide the bond coat that just couldn't be attained with specification tack coats.
 - ▶ No specification – bring your game
 - ▶ In-field laboratory controls
 - ▶ Consistent application and testing equipment
 - ▶ Laboratory testing of emulsions and bonding characteristics

HPTC



HPTC



HPTC



HPTC



HPTC



HPTC



HPTC



HPTC



Engineered Bond Coat

- ▶ Engineered bond coats address the primary issues faced when using specification tack coats by ensuring the bond is maintained during paving operations. Eliminating tracking insures the desired bond between layers is achieved and promotes compaction through reduction of mix creep.
 - ▶ Project type – overlay or mill & fill
 - ▶ Temperatures - Day or night paving
 - ▶ Traffic requirements
 - ▶ Storage requirements

EARTHBIND® NTBC-41 NON-TRACK BOND COAT



	Test Method	Specification	
		MIN	MAX
Tests on Emulsion			
Saybolt Viscosity @ 25°C (77°F), SFS	ASTM D7496	10	75
Sieve Test, %	ASTM D6933	-	0.1
Residue, % by Evaporation (weight)	ASTM D6934	10	-



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		Type A, RHMA-G											
HMA Over:		CS11/CS1h, SS1/SS1h and QS1h/CS1h	RS1	QS1 or CQS1	CRS1	RS2	CRS2	PMRS2, PMCRS2, PMRS2h or PMCRS2h	CS11/CS1h, SS1/SS1h and QS1h/CS1h	SS1/SS1h and QS1h/CS1h			
Undiluted Emul	Sec. 94 Residue by distillation, %	57%	55%	57%	60%	63%	65%	65%	57%	57%			
	New HMA (Between Layers)	**0.04	0.06	0.06	0.06	0.05	0.05	0.05	0.06	0.06			
	Concrete pavement and existing asphalt concrete surfacing	0.06	0.08	0.08	0.07	0.07	0.07	0.07	0.05	0.09			
	Placed Pavement	0.09	0.11	0.11	0.10	0.10	0.10	0.10	0.09	0.11			
	** calculated value of 0.04 gal/sy. Spray nozzles limit minimum application rate to 0.05 gal/sy.												
		90.00% Original Emulsion, 10% Added Water (90/10), Diluted A											
HMA Over:		CS11/CS1h, SS1/SS1h and QS1h/CS1h	RS1	QS1 or CQS1	CRS1	RS2	CRS2	PMRS2, PMCRS2, PMRS2h or PMCRS2h	CS11/CS1h, SS1/SS1h and QS1h/CS1h	SS1/SS1h and QS1h/CS1h			
Diluted 90/10 (1:9) (Added Water: Orig. Emulsion)	Sec. 94 Residue by distillation, %	57%	55%	57%	60%	63%	65%	65%	57%	57%			
	New HMA (Between Layers)	**0.04	—	0.06	—	—	—	—	0.06	0.06			
	Concrete pavement and existing asphalt concrete surfacing	0.06	—	0.08	—	—	—	—	0.10	0.10			
	Placed Pavement	0.10	—	0.12	—	—	—	—	0.12	0.12			
	** calculated value of 0.04 gal/sy. Spray nozzles limit minimum application rate to 0.05 gal/sy.												
		80.00% Original Emulsion, 20% Added Water (80/20), Diluted A											
HMA Over:		CS11/CS1h, SS1/SS1h and QS1h/CS1h	RS1	QS1 or CQS1	CRS1	RS2	CRS2	PMRS2, PMCRS2, PMRS2h or PMCRS2h	CS11/CS1h, SS1/SS1h and QS1h/CS1h	SS1/SS1h and QS1h/CS1h			
Diluted 80/20 (1:4) (Added Water: Orig. Emulsion)	Sec. 94 Residue by distillation, %	57%	55%	57%	60%	63%	65%	65%	57%	57%			
	New HMA (Between Layers)	0.05	—	0.07	—	—	—	—	0.07	0.07			
	Concrete pavement and existing asphalt concrete surfacing	0.07	—	0.09	—	—	—	—	0.11	0.11			
	Placed Pavement	0.11	—	0.14	—	—	—	—	0.14	0.14			
	* Use caution when applications rates are above 0.15 gal/sy because of potential tack coat puddling and runoff.												
		70.00% Original Emulsion, 30% Added Water (70/30), Diluted A											
HMA Over:		CS11/CS1h, SS1/SS1h and QS1h/CS1h	RS1	QS1 or CQS1	CRS1	RS2	CRS2	PMRS2, PMCRS2, PMRS2h or PMCRS2h	CS11/CS1h, SS1/SS1h and QS1h/CS1h	SS1/SS1h and QS1h/CS1h			
Diluted 70/30 (1:2.33) (Added Water: Orig. Emulsion)	Sec. 94 Residue by distillation, %	57%	55%	57%	60%	63%	65%	65%	57%	57%			
	New HMA (Between Layers)	0.06	—	0.08	—	—	—	—	0.08	0.08			
	Concrete pavement and existing asphalt concrete surfacing	0.08	—	0.11	—	—	—	—	0.13	0.13			
	Placed Pavement	0.13	—	*0.16	—	—	—	—	*0.16	*0.16			
	* Use caution when applications rates are above 0.15 gal/sy because of potential tack coat puddling and runoff.												
		60.00% Original Emulsion, 40% Added Water (60/40), Diluted A											

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Specification Fog Seal

- ▶ Specification fog seals are asphalt emulsions that conform to a wide specification range and have been the the industry standard over many years.

CSS-1 Dilute



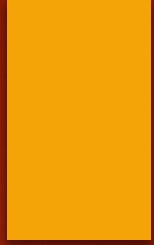
CRS-2P / HFRS-P1 Dilute



Engineered Fog / Mastic Seal

- ▶ Engineered fog / mastic seals are formulated to meet customer expectations utilizing project data.
 - ▶ Average daily traffic
 - ▶ Type of traffic
 - ▶ Environmental / Time of day considerations
 - ▶ Road condition
 - ▶ Skid resistance
 - ▶ Return to traffic requirements

BL-Fog



BL-Fog



BL-Fog



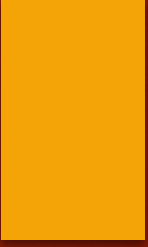
BL-Fog



BL-Fog



BL-Fog



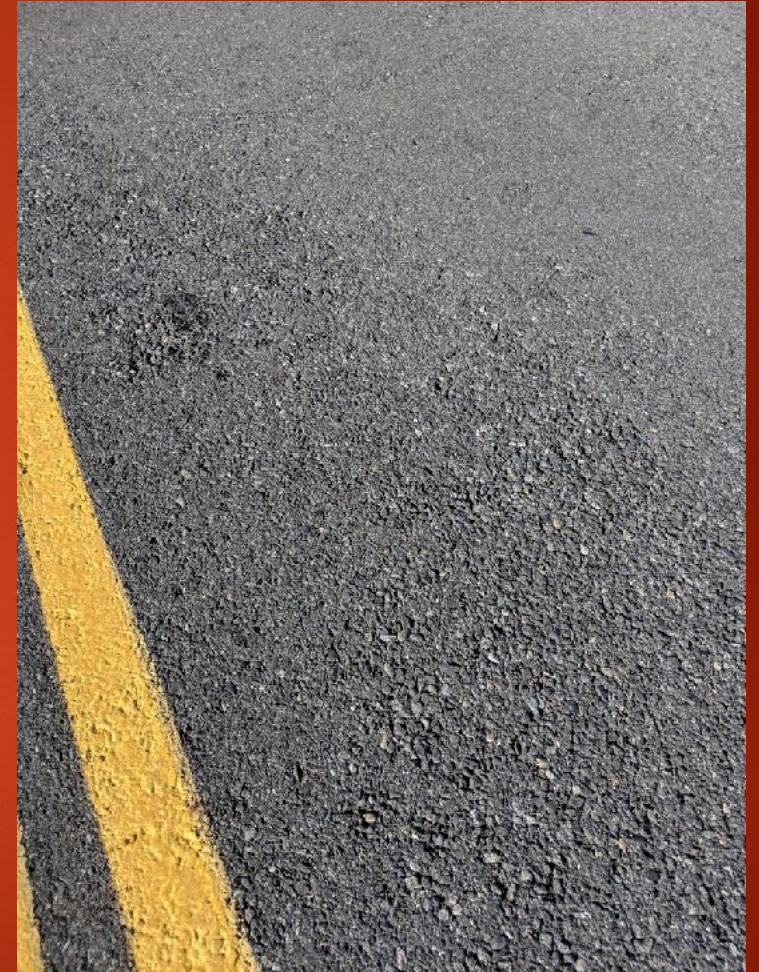
BL-Microcoat



BL-Microcoat



BL-Microcoat



BL-Microcoat



BL-Microcoat



BL-Microcoat



BL-Microcoat



BL-Microcoat



BL-Microcoat



Questions?

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