State: Michigan	**Materials:** Section 904.03
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Michigan		Table 1: Requirements for Anionic Emulsified Asphalts from Table 904-5									
Property		**Test Method, AASHTO (T), ASTM (D), or Other**	**RS-1m**	**RS-2a**	**HFRS-2**	**MS-Op**	**MS-2h**	**MS-2s**	**SS - 1h**	**LTBC - 1**	**LTBS -2**
EMULSIONS:											
Viscosity, Saybolt Furol	25 °C, sec	T 59/ D 7496	20-100	-	-	-	-		20 - 100	15 - 100	15 - 100
	50 °C, sec		-	50-300	50 - 300	15 - 150	50 - 300	50 - 300	-	-	-
Storage Stability Test, 24 hour, % Difference max.		T59 / D6930	2	2	2	3	3	3	2	1	-
Settlement and Storage Stability test, 5-day, % difference max., 5 days, %		T59 / D6930	-	-	-	-	-	-		5	5
Demulsibility,	35 ml 0.02 N CACl2, %	T59 / D6936	20 - 60	≥ 60	≥40	-	-	-	-	-	-
	50 ml 0.1 N CaCl2, %		-	-	-	-	-	-	≤ 2	-	-
	50 ml 0.02 N CaCl2, %		-	-	-	-	-	-	-	-	-
Sieve Test, % max		T59/ D6933,	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.30	0.30
Miscibility with water (a)		D244	-	-	-	-	-	-	Yes	-	-
Distillation to 260°C, % by weight		T59/ D6997									
Residue., min			65	65	65	65	65	65	65	50	50
Oil Distillate, max			2	2	2	25	7	7	2	1	1

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Michigan	Table 1: Requirements for Anionic Emulsified Asphalts from Table 904-5 Continued									
Property	**Test Method, AASHTO (T), ASTM (D), or Other**	**RS-1m**	**RS-2a**	**HFRS-2**	**MS-Op**	**MS-2h**	**MS-2s**	**SS - 1h**	**LTBC - 1**	**LTBS -2**
Tests on Distillation Residue										
Penetration, 25 ºC, 100 g, 5 sec, dmm,	T49 / D5	100-200	100-200	100 - 200	(Note b)	150 - 300	≥300	40-90	≤20	≤40
Float Test, sec — At 50 °C, max	T50 /D139	-	-	-	200	-	-	-	-	-
Float Test, sec — 60 °C, min		-	-	1200	-	1200	1200	-	-	-
Ductility, 25 ºC , cm, min	T51/ D113	60	60	60	40 (Note 2)	-	-	40	-	-
Solubility in trichloroethylene, % min	T44/D2042	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5	97.5
Ash Content, % max	D128	2	2	2	2	2	2	2	-	-
Specific Gravity,25/ 25 °C, min	T228/ D70	0.996	0.996	0.996	-	-	-	-	-	-
Softening Point, Ring and Ball, °C, min	T53/ D36	-	-	-	-	-	-	-	60	-
Section Number Reference			401		501		501	501, 805	501, 805	501, 805
Notes	**a. No appreciable coagulation or visible separation in 2 hours** **b. Heat the distillation residue (ASTM D243/ D243M) to 100±15 penetration within 2 hours and have a ductility of at least 40 cm.**									

Michigan		Table 2: Requirements for Cationic Emulsified Asphalts from Table 904-6				
Property		**Test Method, AASHTO (T), ASTM (D), or Other**	**CRS-1**	**CRS-2**	**CMS-2**	**CCS-1h**
Tests on Emulsions:						
Viscosity, Saybolt Furol	25 °C, sec	T 59/ D 7496		-	-	20 - 100
	50 °C, sec		20-100	100-400	50-450	
Storage Stability Test, 24 hour, % Difference max.		T59 / D6930	1	1	1	1
Demulsibility, %, min. (a.)	35 ml 0.8% dicotyl sodium sulfosuccinate, min.	T59 / D6936	40	40	-	-
	50 ml 0.1 N CaCl2, %		-	-	-	-
	50 ml 0.02 N CaCl2, %		-	-	-	-
Particle Charge Test (b)		T59/ D6933,	Postive	Postive	Postive	Postive
Sieve Test, % max (distilled water)		T 59/ D 6933,	0.10	0.10	0.10	0.10
Distillation to 260°C, % by weight		T 59/ D 6997				
Residue., min			65	65	65	60
Oil Distillate, max			3	3	12	-
Cement Mixing Test, % max.		T 59 / D 6935	-	-	-	2
Coating Ability and Water Resistance	Coating by dry aggregate		-	-	Good	-
	Coating after Spraying		-	-	Good	-
	Coating Wet Aggregate		-	-	Fair	-
	Coating after Spraying		-	-	Fair	-

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Michigan		Table 2: Requirements for Cationic Emulsified Asphalts from Table 904-6 Continued				
Property		**Test Method, AASHTO (T), ASTM (D), or Other**	**CRS-1**	**CRS-2**	**CMS-2**	**CCS-1h**
Tests on Distillation Residue						
Penetration, 25 ºC, 100 g, 5 sec, dmm,		T 49 / D 5	100 - 250	100 - 250	100 - 250	40 - 90
Ductility,	At 25 °C, 5 cm/min,	T 51 / D 113	40	40	40	40
	At 4 °C, 5 cm/min,		-	-	-	-
Solubility in trichloroethylene, % min		T44/D2042	97.5	97.5	97.5	97.5
Ash Content, % max		D128	2	2	2	2
Specific Gravity,25/ 25 °C, min		T228/ D70	0.996	0.996	-	-
Section Number Reference					501	501,805
Notes		**a. The demulsibility test must be made within 30 days from date of shipment b. If the particle charge test is inconclusive, material having a maximum pH of 6.7 is acceptable.**				

Michigan		Table 3: Requirements for Capital Preventive Maintenance Emulsions from Table 904-7 (a.)						
Property		**Test Method, AASHTO (T), ASTM (D), or Other**	**HFRS - 2M**	**CRS-2M**	**CSS-1mM**	**CSS-1hM**	**PPSS**	**CSEA**
Tests on Emulsions:								
Viscosity, Saybolt Furol	25 °C, sec	T 59/ D 7496		-	20-100	20 - 100	20 - 100	-
	50 °C, sec		75-300	75-300	-	-	-	75-400
Storage Stability Test, 24 hour, % Difference max.		T59 / D6930	1	1	1	1	1 (b.)	1
Demulsibility	35 ml 0.8% dicotyl sodium sulfosuccinate, %, min.(c)		-	50	-	-	60	50
	35 ml 0.02 N $CACl_2$, %, min.	T59 / D6936	-	-	-	-	60	-
	50 ml 0.1 N $CaCl_2$, %		-	-	-	-	-	-
	50 ml 0.02 N $CaCl_2$, %		≥50	-	-	-	-	-
Particle Charge Test (d.)		T59/ D6933,		Postive	Postive	Postive		Postive
Sieve Test, % max (distilled water)		T59/ D6933,	0.10	0.10	0.10	0.10	0.05	0.10
Miscibility with water (e)		D244	-	-	-	-	-	-
Distillation to 260˚C, % by weight		T59/ D6997	(f)	(f),(g)	(f)	(f)	(f)	(g)
Residue., min			65	65	62	62	63	68
Oil Distillate, ml,max			2	3	-	-	2	3

Table 3 Continues on Page 6

Michigan		Table 3: Requirements for Capital Preventive Maintenance Emulsions from Table 904-7 (a.) Continued						
Property		**Test Method, AASHTO (T), ASTM (D), or Other**	**HFRS - 2M**	**CRS-2M**	**CSS-1mM**	**CSS-1hM**	**PPSS**	**CSEA**
Tests on Distillation Residue								
Penetration, 25 ºC, 100 g, 5 sec, dmm,		T49 / D5	80-150	80-150	70-90	40-90	80-150	70-100
Ductility,	At 25 °C, 5 cm/min, cm	T51 / D113	-	-	40	40	-	40
	At 4°C, 5 cm/min,		-	-	35	-	-	-
Elastic Recovery,4°C , % min.,		T 301/ D 6084	-	-	65	-	-	-
Float Test, sec	At 50°C, max	T50 / D139	-	-	-	-	-	-
	At 60°C, min		1200	-	-	-	-	-
Solubility in trichloroethylene, % min		T44/D2042	-	-	97.5	97.5	-	97.5
Ash Content, % max		D128	2	2	2	2	-	2
Specific Gravity, 25/ 25°C, min		T228/ D70	-	-	-	-	-	-
Toughness/ tenacity, 25°C, 50 cm/min., Nm, min.,		D5801	4.5/3.5	4.5/3.5	-	-	-	9.0/7.0
Elastic Recovery, 10C, % min.		T301/D6084	60%	60%	-	-	60%	75%

Table 3 Continues on Page 7

Michigan	Table 3: Requirements for Capital Preventive Maintenance Emulsions from Table 904-7 (a.) Continued						
Property	**Test Method, AASHTO (T), ASTM (D), or Other**	**HFRS - 2M**	**CRS-2M**	**CSS-1mM**	**CSS-1hM**	**PPSS**	**CSEA**
Tests on Evaporation Residue (h)							
Softening Point, Ring and Ball, °C, min	T53/ D36	-	-	60	57.2	-	-
Viscosity, 60°C, Pa·s	T202/D2171	-	-	800(i)	800 (i)	-	-
Section Number Reference		-	505	504	501,504	503	505
Notes	**a. Samples of emulsified asphalt will be taken in accordance with ASTM D140/D140M. Samples must be stored at a temperature of not less than 4°C until tested** **b. After standing undisturbed for 24 hours, the surface must show no white, milky colored substance but, must be a smooth homogenous color throughout. Any visible amount of white, milky color is basis for non-acceptance.** **c. The demulsibility test must be made within 30 days from date of shipment.** **d. If particle charge test is inconclusive, material having a maximum pH of 6.7 is acceptable.** **e. No appreciable coagulation or visible separation in 2 hours** **f. ASTM D6997, with modifications to include a 204°C (± 6°C) maximum temperature to be held for 15 minutes.** **g. Residue determination and preparation may use the alternative ASTM D6934 method, "Residue by Evaporation,' so as to not destroy the properties of any polymer modifiers contained therein.** **h. Residue by evaporation. Oven evaporate an emulsion sample on a glass plate at a maximum temperature of 60 C for 24 hours (forced draft oven recommended) or air dry the sample at ambient temperature for 3 days, Once dry, the sample is scraped from the plate using a razor blade tool.** **i. The minimum viscosity will be obtained using a Cannon-Manning Vacuum Capillary Viscometer Tube No. 14 per T202/D2171.**						