INTERNATIONAL SLURRY SURFACING ASSOCIATION

No. 107

TECHNICAL BULLETIN

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A Method for Unit Field Control of Slurry Seal Quantities

1. The objective of this bulletin is to aid operators and inspectors to control the field material quantities and application rates so that design results are obtained. The **method** is essentially to translate laboratory design into field units of gallons tons and bags and to measure these during application.
2. ISSA A-105 Recommended Performance Guidelines for Emulsified Asphalt Slurry Seal Surfaces, 2005, requires that all materials to be incorporated into the work, be selected and tested and a laboratory mix design be made and tested on a Wet Track Abrasion machine (WTAT) **prior to starting** the work.
3. The **laboratory should furnish** the operator and inspector the essential design information as shown in the example below.
4. The **"Bulking " effect of moisture contents** on the specific weight (pounds per cubic foot of dry aggregates) may be field checked by weighing a given volume of loose job aggregate and converting to weight per cubic foot. By comparison the laboratory chart, moisture con- tents can be estimated and corrections made in machine settings as indicated. Each aggregate has its own bulk- ing characteristics.
5. **Calibration** of each machine to be used on the job is essential, and is normally done by the contractor in accordance with the manufacturer's instructions. The procedure involves weighing each material as it is discharged at either a unit time per RPM and setting, or unit number of revolutions of the drive at various settings. The results are then plotted on a reference chart.
6. Calibrated **liquid level gauges** of the float ball or sight gauge type should be mounted in the tanks of the slurry machine so that they can be easily read to within 10 gallons from the operator's platform or from the ground.
7. The exact residual **AC content of each tanker load of emulsion** should be plainly marked on the load tickets so that changes affecting the design can be make in machine settings by use of the table on page 2 for field determination of residual AC in slurry seals.
8. Mix Consistency may be controlled by the Kansas Cone Method described in ISSA TB #106 or by direct control of mix water used, and translating to the laboratory design as shown in the table on page two.
9. A **Daily Control Log** form is shown on page three which has been successfully used. Provision is made for recording the quantities used on each load. Comparison with actual and design quantities can then be made directly in the field.

Laboratory Design for Field Control

-EXAMPLE-

	Optimum Lab Design Control Quantities		Tolerances
a) Aggregate	100.0%		
b) Filler* Type PC-11	1.0%	2 bags/10 tons	± 1/2 bag
c) Mix Water*	12.0%	29 gals./ton (121 l/t)	± 1%
d) Cone Flow Consistency	2.5 cm.		± 0.75 cm.
e) AC Target Extraction	10.5%		± 1.5%
f) Emulsion* @ 61.0% Residual AC	17.2%*	41.0 gals./ton (171 l/t)	± 1.7%
g) Design Width	20.0 ft.(6.6 m)	2 lanes x 10 ft.(3.05 m)	± 0.5'(.152 m) OA
h) Spread Rate	15.0 lbs./SY (8.14 kg/m²)		± 2.0 lbs./SY(1 kg/m²)
	133.0 SY/ton (123 m²/t)		
i) Lineal ft./ton @ 10 ft. Lane Width	120.0 LF/ton (40.3 m/t)		

j) Aggregate Specific Weight vs. Moisture Content:

Moisture Content	Moisture lbs./ft³ Loose	Dry lbs./ft³of Moist Agg.	% Dry/Wet
0%	96.4 (1544.1 kg/m³)	96.4 (1544.1 kg/m³)	100.0
1	95.4 (1528.1 kg/m³)	94.5 (1513.7 kg/m³)	98.0
2	83.6 (1339.1 kg/m³)	81.9 (1311.9 kg/m³)	84.9
3	79.7 (1276.6 kg/m³)	77.3 (1238.2 kg/m³)	80.1
4	79.0 (1265.4 kg/m³)	75.8 (1214.2 kg/m³)	78.6
5	78.0 (1249.4 kg/m³)	74.1 (1186.9 kg/m³)	76.8
6	77.9 (1247.8 kg/m³)	73.2 (1172.5 kg/m³)	75.9

* Percent added to the dry weight of the aggregate

Note: Unit (t) = metric ton

Table for Field Determination of Mix Water added to Slurry Mixes

% Water Added	Gallons/ Ton	Liters/Metric Ton	% Water Added	Gallons/ Ton	Liters/ Metric Ton	% Water Added	Gallons/ Ton	Liters/ Metric Ton	% Water Added	Gallons/ Ton	Liters/ Metric Ton
1	2.4	10	6	14.4	60	11	26.4	110	16	38.4	160
2	4.8	20	7	16.8	70	12	28.8	120	17	40.8	170
3	7.2	30	8	19.2	80	13	31.2	130	18	43.2	180
4	9.6	40	9	21.6	90	14	33.6	140	19	45.6	190
5	12.0	50	10	24.0	100	15	36.0	150	20	48.0	200

Note: Calculations are based on water @ 8.34 pounds per gallon. Deductions from the design percentage should be made for moisture in the aggregate and pre-wet spray bar water use of 0.1 to .07 gallons per SY, typically 20 to 90 gal/10 ton (0.45 to 0.32 l/m², typically 8.3 to 37.5 l/metric ton).

TABLE FOR UNIT FIELD DETERMINATION OF PERCENT OF ASPHALT CEMENT IN DRY SLURRY MIXES

AE Gals Per Ton	AE % Added	% ASPHALT CEMENT IN THE DRY SLURRY								
		Percent Asphalt Residue in the Emulsion								
		57	58	59	60	61	62	63	64	65
25 (104.3 l/ton)	10.5	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8
26 (108.3)	10.9	6.2	6.3	6.4	6.6	6.7	6.8	6.9	7.0	7.1
27 (112.3)	11.3	6.5	6.6	6.7	6.8	6.9	7.0	7.1	7.3	7.4
28 (116.2)	11.7	6.7	6.8	6.9	7.1	7.2	7.3	7.4	7.5	7.6
29 (121.2)	12.2	6.9	7.1	7.2	7.3	7.4	7.6	7.7	7.8	7.9
30 (125.2)	12.6	7.2	7.3	7.4	7.6	7.7	7.8	7.9	8.1	8.2
31 (129.2)	13.0	7.4	7.6	7.7	7.8	7.9	8.1	8.2	8.3	8.5
32 (133.1)	13.4	7.7	7.8	7.9	8.1	8.2	8.3	8.5	8.6	8.7
33 (138.1)	13.9	7.9	8.0	8.2	8.3	8.5	8.6	8.7	8.9	9.0
34 (142.1)	14.3	8.1	8.3	8.4	8.6	8.7	8.9	9.0	9.1	9.3
35 (146.0)	14.7	8.4	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6
36 (150.0)	15.1	8.6	8.8	8.9	9.1	9.2	9.4	9.5	9.7	9.8
37 (154.0)	15.5	8.9	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1
38 (159.0)	16.0	9.1	9.3	9.4	9.6	9.7	9.9	10.1	10.2	10.4
39 (162.9)	16.4	9.3	9.5	9.7	9.8	10.0	10.2	10.3	10.5	10.6
40 (166.9)	16.8	9.6	9.7	9.9	10.1	10.2	10.4	10.6	10.8	10.9
41 (170.9)	17.2	9.8	10.0	10.2	10.3	10.5	10.7	10.8	11.1	11.2
42 (174.9)	17.6	10.1	10.2	10.4	10.6	10.8	10.9	11.1	11.3	11.5
43 (179.8)	18.1	10.3	10.5	10.7	10.8	11.0	11.2	11.4	11.6	11.7
44 (183.8)	18.5	10.5	10.7	10.9	11.1	11.3	11.5	11.6	11.8	12.0
45 (187.8)	18.9	10.8	11.0	11.2	11.3	11.5	11.7	11.9	12.1	12.3
46 (191.7)	19.3	11.0	11.2	11.4	11.6	11.8	12.0	12.2	12.4	12.6
47 (195.7)	19.7	11.3	11.4	11.6	11.8	12.0	12.2	12.4	12.6	12.8
48 (200.7)	20.2	11.5	11.7	11.9	12.1	12.3	12.5	12.7	12.9	13.1
49 (204.7)	20.6	11.7	11.9	12.1	12.3	12.6	12.8	13.0	13.2	13.4
50 (208.6)	21.0	12	12.2	12.4	12.6	12.8	13.0	13.2	13.4	13.7
51 (212.6)	21.4	12.2	12.4	12.6	12.9	13.1	13.3	13.5	13.7	13.9
52 (216.6)	21.8	12.4	12.7	12.9	13.1	13.3	13.5	13.8	14.0	14.2
53 (221.5)	22.3	12.7	12.9	13.1	13.4	13.6	13.8	14.0	14.2	14.4
54 (226.5)	22.8	12.9	13.2	13.4	13.6	13.8	14.1	14.3	14.5	14.7
55 (229.5)	23.1	13.2	13.4	13.6	13.9	14.1	14.3	14.6	14.8	15.0

Note: A.E. weight is taken at 8.4 lbs. per gallon. Figures are to the nearest tenth. Make corrections for emulsion temperature and aggregate moisture.

TREATMENT CONTROL LOG

Day_____ Date_____ Job No._____ Location _____

Fine Feed SETTING		Gate SETTING			Weather	Start Time	
	Mach. No.		Aggregate, lbs./ft³ (kg/m³)				
	Mach. No.		Moisture, %		A.M.	End Time	
	Mach. No.		Emulsion, AC%		P.M.	Crewman No.	
	Mach. No.		Box Runner Setting, in. (cm)			SY(m²) Complete	

Load No.	Machine No.	AGGREGATE			WATER				EMULSION				Filler Design Bags/10tn:	SPREAD RATE				ROAD OR STREET NAME	Time Load Finished
					Design gal/ton (l/ton) =				Design gal/ton (l/ton) =					Design SY/ton (m²/Ton)					
		Ticket No.	Cwt.	Tons	Start	End	Used	Gal/Ton (l/Ton)	Start	End	Used	Gal/Ton (l/Ton)		Lineal Feet(m) x	Width	SY (m²)	SY/Ton (m²/Ton)		
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
Totals																			