STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

DEPARTMENT OF TRANSPORTATION
ENGINEERING SERVICE CENTER
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METHOD OF FIELD TEST FOR THE DETERMINATION OF DISTRIBUTOR SPREAD RATE

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Part 2, Section H of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

This test method covers the procedure for determining the transverse and longitudinal spread rate in liters per meter squared of bituminous material.

PART 1. TRANSVERSE SPREAD

RATE DETERMINATION

A. APPARATUS

1. Balance sensitive to 0.1 g.
2. Suitable weighing box or shield for balance.
3. Metal sheets, approximately 200 by 1525 mm 20-gage galvanized.
4. Balance table and work table.

B. MATERIALS

1. Absorbent Panels: There are seven 102 by 204 mm absorbent cotton pads attached to each panel with perforations between each pad so that they may be easily separated.

NOTE: The above panels may be prepared, if not available, by cementing 102 by 204 mm cotton pads, (non-sterile sponges) to suitable heavyweight paper. Each panel should be 408 by 714 mm.

The panel should be perforated accurately at 102 mm intervals at right angles to the 714 mm length, prior to attaching the pads. It should also be creased the long way so as to leave an 204 by 714 mm area in the center (see Figure 1). Panels may be perforated down the center the long way to facilitate folding after the binder has been caught.

C. MATERIALS (ALTERNATE METHOD)

1. Cotton pads, 102 by 204 mm. These are designated as 102 by 102 mm, but open out to 102 by 204 mm. Cotton pads having approximately the same dimensions may be used (one supplier provides 99 by 184 mm pads), but equivalent constants to determine the spread rate must be calculated; for example:

$$\frac{102 \times 204}{99 \times 184} \times 0.0484 = 0.0553$$

2. 127 by 254 mm strips cut from heavy wrapping paper.
3. 204 by 1525 mm sheets cut from 20-gage galvanized metal scribed at 102 mm intervals after the first one at 127 mm.

4. Masking tape, 12.7 mm.

5. Suitable adhesive for fastening cotton pads to paper (latex, rubber cement, and asphalt emulsion have been used).

D. PREPARATION OF TEST PLATES

1. Remove several individual pads from a panel and weigh to determine the average tare mass. The remainder of the panel may be used for the longitudinal spread determination.

2. Fold two absorbent panels, Figure 1, over each metal sheet with the cotton pad side out. One end of panel must be flush with the end of the metal sheet. Place second panel snug against end of first panel.

3. Secure panels to metal sheet with tape on reverse side of sheet.

E. PREPARATION OF TEST PLATES (ALTERNATE METHOD)

1. Attach the 127 by 254 mm paper strips to the metal sheets with masking tape, each strip overlapping the adjacent strip 25 mm.

2. After all the paper strips have been attached to the metal sheets, coat the paper surface uniformly with the adhesive. Then place the cotton pads on the paper so that each pad covers exactly the exposed 102 by 204 mm paper surface. Figure 2 shows the paper strip and part of the cotton pads in place.

3. Weigh several of the pads with the paper backing attached after the adhesive is thoroughly dry to determine the tare mass.

F. SAMPLING

1. As the distributor approaches, place the test plates across the roadway; see Figures 3 and 4. In laying the plates across the pavement, it is good practice to place the bare ends towards the shoulder side of the lane. This procedure will facilitate removal from the pavement and aid in keeping the pads in proper sequence.

2. As soon as the distributor has passed, remove the test plates from the pavement. When the procedure involves the use of absorbent panels (see B.1), remove the panels, fold along the center line, and then remove each pad by tearing along the perforations. In the case of test plates prepared by the alternate method, place the entire assembly on a rack (see Figure 5), then remove and fold each pad and paper strip. In order to properly identify the pads and expedite weighing operations, number the pads on the back side of the test plate starting with pad No. 1 nearest the center line of the pavement. Remove the pads in order starting with the pad nearest the shoulder line and stacking each pad on the previous one so that the stack will be completed on removal of the pad numbered one that is nearest the center line.

3. As soon as the removal operation is completed, place the pads in the weigh box, and then weigh in order to the nearest 0.1 g (see Figures 6 and 7). Record the mass of each pad on Form TL-3025, starting the recording with pad No. 1, the pad nearest the center line of the pavement. If a tare is used during the weighing, then record the net mass of the bitumen in column 2 of Form TL-3025; otherwise, the previously determined average mass of the individual pads must be subtracted from the total mass of pad + bitumen.

G. CALCULATIONS

1. Multiply the net mass of binder on each pad by 0.0484, or use the attached table to obtain the spread rate in liters per meter squared.

2. Determine the average spread rate in liters per meter squared. Omit end pads that show very low spread rates due to feathering, and also end pads showing a heavy rate due to the use of shields. Normally, those to be eliminated can be determined by inspection, but if a more uniform method is desired, the following procedure may be used:

   a. Divide the total quantity of binder collected on the pads by the number of pads and multiply by 0.0484. This constant applies to 102 x 204 mm pads. For pads having other sizes, establish an appropriate constant.

Calculate the average spread rate using all pads having a binder content over 0.2 L/m^2. Omit all end pads varying more than 0.15 % (plus and minus), then recalculate the average spread rate.

3. For further study, plot the test results together with the average spread rates and the specified limits.

H. PRECAUTIONS

1. Do not allow traffic to drive over the sample pads (the relatively slow-moving distributor does not disturb the test plates).

2. In very hot weather, remove and weigh the sample pads in the shade and with as little delay as possible. If substantial delay occurs, prepare a control sample with a known mass of binder and weigh at intervals to determine the correction due to evaporation.

I. NOTES

A light metal camp table has been found very useful in removal and separation of the sample pads; see Figure 5. Since all weighing must be done at the job site and as rapidly as possible, it is best to use a separate table for the balance. The balance is placed inside a specially constructed box so that the operator can work with his hands and forearms inside (see Figure 7). The quantity on each pad, in L/m^2, should be recorded or plotted directly on graph paper.

LONGITUDINAL SPREAD RATE DETERMINATION

A. APPARATUS

Balance sensitive to 0.1 g.

B. MATERIALS

1. Absorbent panels.

2. Cotton pads, 102 by 204 mm, of the same type used for transverse measurements (see C.1 of Part 1).

3. 127 by 254 mm strips cut from heavy wrapping paper.

4. 200 by 1525 mm sheets cut from 20-gage galvanized metal.

5. Masking tape, 12.7 mm width.

6. Suitable adhesive for fastening cotton pads to paper (see Part 1, C.5).

C. PREPARATION OF TEST PLATES

1. Remove a section of three pads from the transverse pad panel, see Figure 1, by tearing along a line of perforations.

2. Secure panel containing the three pads to the metal sheet using tape on the reverse side of sheet.

3. Determine tare mass of pads, and if desired, prepare a tare mass.

D. PREPARATION OF TEST PLATES (ALTERNATE METHOD)

3. Attach cotton pads to the 127 by 254 mm paper strips with adhesive, leaving a 25 mm margin on three sides (see Figure 8).

4. Fasten three paper strips with attached pads to the metal sheet by folding the ends over the sheet and attaching with masking tape. Each successive strip overlaps the exposed paper on the previously fastened strip (see Figure 8). Trim off the excess 25 mm edge of the last paper backing strip that extends over the metal sheet.

5. Weigh several of the pads with the paper backing after the adhesive is thoroughly dry and determine the average tare mass.

6. Prepare a tare mass, if desired, for use in weighing.

E. SAMPLING

1. Place test panels at not less than 30 m intervals and equidistant from the centerline and edge of pavement.

2. After the distributor has passed, remove pads from metal sheets and weigh to nearest ± 0.1 g. (see F, Sampling, of Part 1).

F. CALCULATIONS

Subtract the tare mass of the pads and multiply the total net

mass of the binder on the three pads by 0.0161 to obtain the spread rate in L/m^2, or determine the mass for one pad and use the attached conversion table.

G. PRECAUTIONS

Care should be taken to place all the sampling units equidistant from the center line or edge of pavement in order that the same jets of the distributor will pass over all the sampling units.

H. SAFETY AND HEALTH

Prior to handling, testing or disposing of any waste materials, testers are required to read: Part A (Section 5.0), Part B (Sections: 5.0, 6.0 and 10.0) and Part C (Section 1.0) of Caltrans Laboratory Safety Manual. Users of this method do so at their own risk.

REFERENCE:

End of Text (California Test 339 contains 8 pages)

CONVERSION TABLE

Net mass of binder on 102 by 204 mm pads to L/m²

grams	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
8	.389	.394	.398	.403	.407	.412	.416	.421	.426	.430
9	.435	.439	.444	.448	.453	.462	.466	.471	.475	.480
10	.484	.489	.493	.498	.502	.507	.512	.516	.525	.530
11	.534	.539	.543	.548	.552	.557	.561	.566	.570	.575
12	.579	.584	.593	.598	.602	.607	.611	.616	.620	.625
13	.629	.634	.638	.643	.647	.652	.661	.665	.670	.675
14	.679	.684	.688	.693	.697	.702	.706	.711	.715	.720
15	.724	.733	.738	.742	.747	.751	.756	.761	.765	.770
16	.774	.779	.783	.788	.792	.801	.806	.810	.815	.819
17	.824	.828	.833	.837	.842	.847	.851	.856	.860	.869
18	.874	.878	.883	.887	.892	.896	.901	.905	.910	.914
19	.919	.924	.928	.933	.942	.946	.951	.955	.960	.964
20	.969	.973	.978	.982	.987	.991	.996	1.000	1.010	1.014
21	1.019	1.023	1.028	1.032	10.37	1.041	1.046	1.050	1.055	1.059
22	1.064	1.068	1.073	1.082	1.086	1.091	1.096	1.100	1.105	1.109
23	1.114	1.118	1.123	1.127	1.132	1.136	1.141	1.150	1.154	1.159
24	1.163	1.168	1.172	1.177	1.182	1.186	1.191	1.195	1.200	1.204
25	1.209	1.218	1.222	1.227	1.231	1.236	1.240	1.245	1.249	1.254
26	1.258	1.263	1.268	1.272	1.277	1.286	1.290	1.295	1.299	1.304
27	1.308	1.313	1.317	1.322	1.326	1.331	1.335	1.340	1.345	1.349
28	1.358	1.363	1.367	1.372	1.376	1.381	1.385	1.390	1.394	1.399
29	1.403	1.408	1.412	1.417	1.426	1.431	1.435	1.440	1.444	1.449
30	1.498	1.458	1.462	1.467	1.471	1.476	1.480	1.485	1.494	1.498
31	1.503	1.507	1.512	1.516	1.521	1.526	1.530	1.535	1.539	1.544
32	1.548	1.553	1.557	1.566	1.571	1.575	1.580	1.584	1.589	1.593
33	1.598	1.603	1.607	1.612	1.616	1.621	1.625	1.634	1.639	1.643
34	1.648	1.652	1.657	1.661	1.666	1.670	1.675	1.680	1.684	1.689
35	1.693	1.702	1.707	1.711	1.716	1.720	1.725	1.729	1.734	1.738

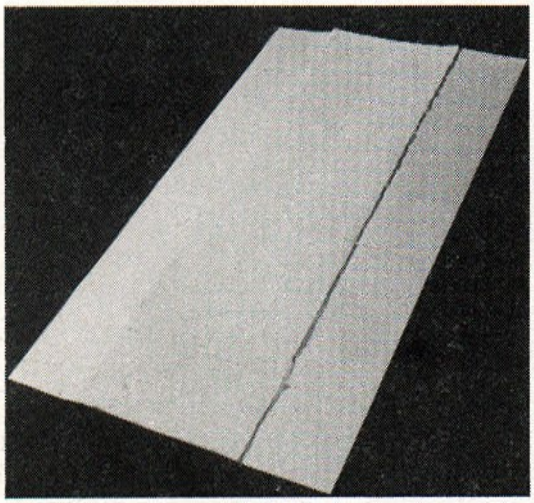

FIGURE 1
TEST PANEL

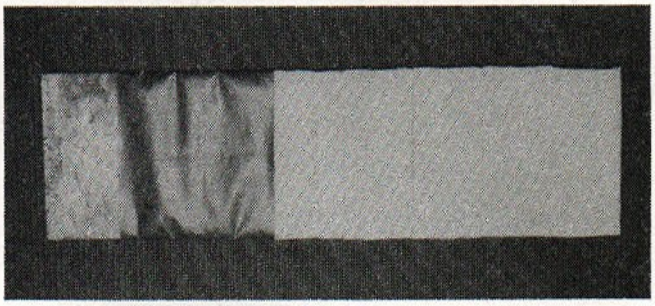

FIGURE 2
TEST PANEL—ALTERNATE METHOD

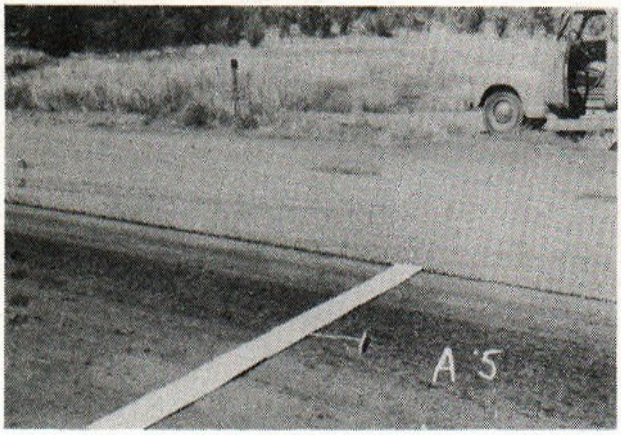

FIGURE 3
TEST PLATES IN POSITION FOR TEST

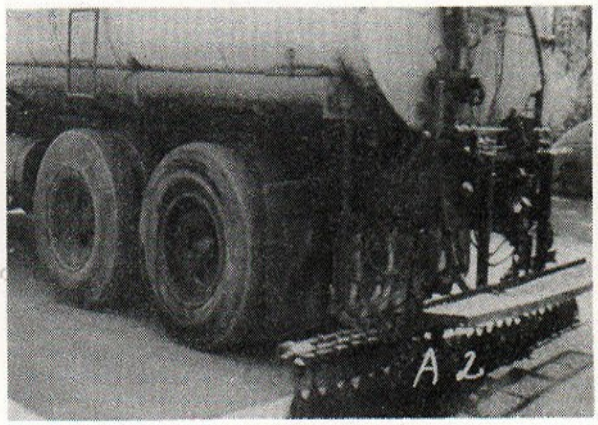

FIGURE 4
DISTRIBUTOR JUST BEFORE PASSING OVER TEST PLATES

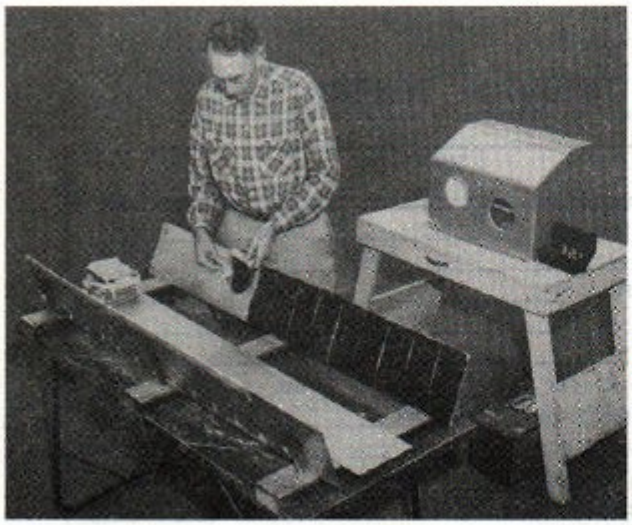

FIGURE 5

REMOVING PADS FROM STEEL PLATE, ALTERNATE METHOD

FIGURE 6

WEIGHING BOX

FIGURE 7
WEIGHING PADS – NOTE PAD STACK INSIDE BOX

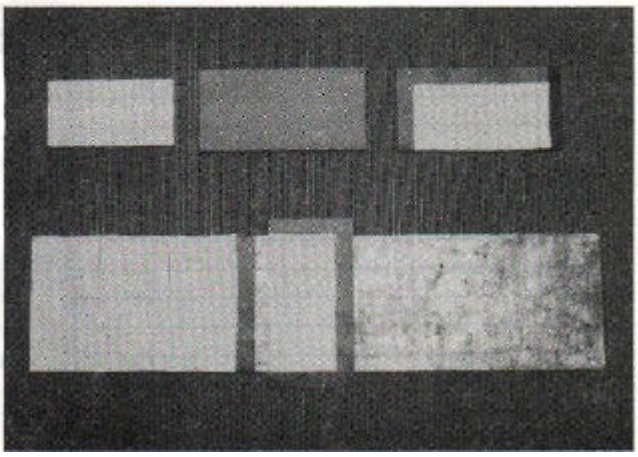

FIGURE 8
PLACING OF 102 BY 204 mm COTTON PADS ON METAL SHEET

TRANSPORTATION LABORATORY

TRANSVERSE & LONGITUDINAL DISTRIBUTOR SPREAD RATES

Test By	Sheet No.

Pad No.	Pad Weight Gross Grams	Pad Weight Net Grams	Spread Rate L/M²	Outside Limits
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
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38				
39				
40				
	TOTALS			

Contract _____ Date _____
Co. _____ Rte. _____ Sec. _____
Contractor _____ R.E. _____
Dist. Owner _____ No. _____
Sta. _____ Lane _____
Type Binder _____ Temp _____
Dist. Condition _____
Spec. Spread _____ L/M²
Tank Gauging _____ L/M²
Direction of Distributor _____

CALCULATIONS
TRANSVERSE SPREAD

Avg. = Total L/M² (omitting end pads*)
No. of Pads

Avg. = _____ L/M²

Avg. +15% _____ L/M²

Avg. -15% _____ L/M²

*See Section G, Calculations of Part I

LONGITUDINAL
SPREAD DETERMINATION

TARE =_____GRAMS

GROSS GRAMS	NET GRAMS	SPREAD RATE L/M²	OUTSIDE LIMITS

Constants, etc.
Start from CL pavement at top of page.
Pad Tare =_____grams.
Binder on pad x 0.0484 = L/M²

TL-3025 (REV. 1-60)

FIGURE 9