Designation: D 5624 – 0~~0~~2

Standard Test Method for Determining the Transverse-Aggregate Spread Rate for Surface Treatment Applications[1]

This standard is issued under the fixed designation D 5624; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method details the procedure for ~~calibrating~~ determining the ~~transverse-aggregate~~ aggregate spread rates in approximately 0.3~~=~~3-m (1~~=~~-ft) transverse increments.

1.2 The values stated in SI units are to be regarded as standard. The inch-pound units shown in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

[1] This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.24 on Bituminous Surface Treatments.

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C 566 Test Method for Total Moisture Content of Aggregate by Drying[2]
C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates[2]
E 898 Method of Testing Top Loading, Direct-Reading Laboratory Scales and Balances[3]

3. Summary of Test Method

3.1 The transverse-aggregate spread rate is determined by the use of a series of rubber pads laid side by side width-wise across the pavement. The chip spreader is then allowed to proceed across the rubber mats with the gates open allowing the aggregate to drop onto the mats. Aggregate collected on each of the mats is removed and weighed. The transverse-aggregate distribution ~~can~~ then ~~be~~ is calculated, and the ~~chip~~ aggregate spreader adjusted if desired. Moisture content and aggregate gradation can be determined from the collected material.

4. Significance and Use

4.1 The results from this test method ~~can be~~ are used to calibrate aggregate spreaders and verify the uniformity of distribution transversely prior to ~~construction.~~

~~4.2 Quality control during~~ construction ~~can be monitored.~~

~~4.3 Moisture content and sieve analysis~~ of the ~~aggregates at~~ surface treatment by determining the ~~time~~ average quantity of aggregate spread per unit area.

4.2 The test method is useful for quality control during construction ~~ca~~ to monitor the spread rate.

4.3 The samples obtained during construction by this test method are useful for determination of moisture content and grading when such information is required.

5. Apparatus

5.1 *Balance*—A balance (or scale) of sufficient capacity to handle the ~~weight~~ mass of the aggregate shall be provided. This balance (or scale) shall be readable and accurate to 1 g if only the transverse spread rate is being determined; an accuracy of 0.1 g is needed if moisture content is being determined. All balances, or scales, shall meet the requirement set forth in Method E 898 for top loading, direct-reading laboratory scales and balances.

5.2 *Containers*—~~Any container~~—Containers, sufficient in number for the number of samples to be taken, and of a sufficient size to hold the contents of one rubber mat. If moisture content is to be determined, then the container ~~should~~ shall be sealable.

5.3 *Rubber Mats*—Rubber mats ~~should~~ shall have grooves of sufficient depth to prevent aggregate from rolling and slipping when the chips are spread. The mats ~~should~~ shall be cut in widths appropriate for the gate openings of the equipment being adjusted. Widths of 0.305 m (1 ft) have been commonly used. The length of the mats ~~should~~ shall be a minimum of 0.9144 m (3 ft). Mats ~~should~~ shall be cut so that the grooves are perpendicular to the 0.9144 m (3 ft) side.

NOTE 1—Rubber floor mats conforming to these specifications are available at local hardware stores. Various sizes can be accommodated and both ~~English~~ inch—pound and SI units can be handled.

5.4 *Oven*—The oven shall be a forced air type oven capable of maintaining a uniform temperature of 110 ± 5°C (230 ± 9°F).

PROCEDURES

6. Determination of Transverse Spread Rate

6.1 Place the rubber mats side by side width-wise on the pavement with the grooves perpendicular to the centerline (Fig. 1). The number of rubber mats to be used shall be equal to the width of aggregate distribution to be monitored.

6.2 Tare one container for each mat to be used. If the container has a lid, tare the container with the lid. Designate this mass as *B*.

6.3 Drive the aggregate spreader over the pads with the gates open to allow the aggregate to fall onto the rubber mats. ~~The~~ Open the gates ~~must be opened~~ a minimum of ~~2.5~~ 2.44 m (8 ft) before reaching the rubber mats. This allows time for the transverse-aggregate distribution to stabilize.

6.4 The aggregate spreader ~~should~~ shall be operated ~~just as if it were being used~~ in the manner intended for use during construction. Speed and gear settings ~~should~~ shall be representative of anticipated construction use.

6.5 After the aggregate spreader has passed over the rubber mats, carefully brush ~~away the aggregate~~ from ~~all~~ the edges toward the center of each rubber mat. Fold each mat lengthwise into a 0.914-m (3-ft) long funnel. Pour the aggregate into a tared, and labeled ~~one gallon~~ container. Repeat this procedure ~~for each mat~~ until ~~all of~~ the aggregate from each of the mats has been placed in individual containers.

6.6 Determine the ~~container.~~

~~6.6 Weigh~~ mass of each container of aggregate. Designate this mass as *A*.

[2] *Annual Book of ASTM Standards*, Vol 04.02.
[3] *Annual Book of ASTM Standards*, Vol 14.02.

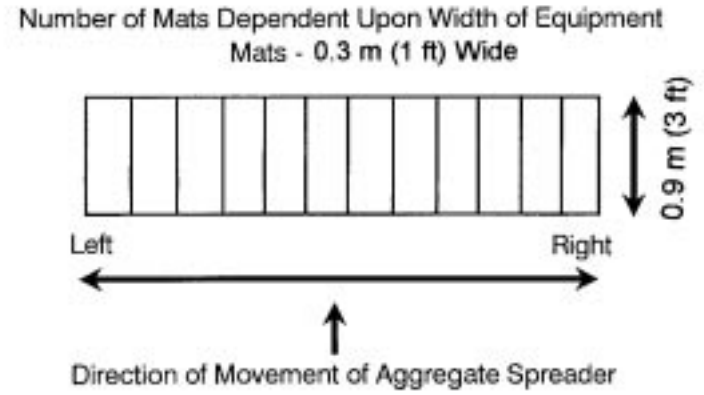

FIG. 1 Layout of Mats

7. Moisture Content of Aggregate (Optional)

7.1 When the moisture content of the aggregate at the time of construction is required, obtain the samples using the steps in 6.1 through 6.6. ~~The~~ Place samples for moisture content determination ~~must be placed~~ in a sealed container within 5 min of spreading the aggregate.

7.2 ~~W~~Determigne the mass of each sealed container of moist aggregate within 4 h of obtaining the sample. Subtract the mass of the container to determine the mass of the moist aggregate.

7.3 Determine the moisture content of the aggregate in accordance with Test Method C 566.

8. Aggregate Gradation (Optional)

8.1 Combine the aggregate from all individual containers into one container. Mix aggregate through riffle splitter at least twice to ensure adequate mixing.

8.2 Oven dry to a constant mass.

8.3 Perform sieve analysis according to Test Method C 136.

9. Calculation

9.1 (SI Units) ~~Mass of~~ The aggregate ~~on each mat:~~ spread rate is determined by the following:

$$S = \frac{10\,(A - B)}{LW} \tag{1}$$

$$S = \frac{C\,(A - B)}{LW} \tag{1}$$

where:

A = mass of aggregate and container, g,
B = mass of container, g,
L = length of mat, mm,
S = aggregate spread rate in kg/m ^{2}, ~~and~~ ,
W = width of mat, mm, and
C = 1000, a constant for unit conversion.

9.2 (Inch-Pound Units) ~~Mass of~~ The aggregate ~~on each mat:~~ spread rate is determined by the following:

$$S = \frac{A - B}{\frac{(LW)}{9}453.6} \tag{2}$$

$$S = C\frac{A - B}{\frac{(LW)}{9}453.6} \tag{2}$$

where:

A = mass of aggregate and container, g,
B = mass of container, g,

L = length of mat, ft,
S = aggregate spread rate in lbs/yd ^{2}~~, and~~ ,
W = width of mat, ft, and
C = 0.01984, a constant for inch-pound unit conversion.

10. Report

10.1 Report the following information:
10.2 Moisture content of aggregate, if determined,
10.3 Aggregate gradation, if determined, and whether the aggregate was pre-coated, pre-wet or dry, and
10.4 The aggregate quantity in kg/m ^{2}(lbs/yd^2)~~ per transverse foot.~~ for each mat. Report results from left to right from the driver's perspective.

11. Precision and Bias

11.1 Preliminary testing~~ suggests~~ indicates that the reproducibility (within-laboratory) standard deviation for this test is 0.47 kg/m^2 (0.86 lbs/yd^2). Because test results are dependent upon individual pieces of equipment, local requirements for operation of equipment, equipment speed, as well as the fact that there is no means of providing a standard material for testing, no estimate of rep~~eata~~roduci bility (between-laboratory standard deviation) can be developed. This precision statement is only for the purposes of defining the ability of one technician to measure the transverse spread rate for any given set of testing conditions.

NOTE 2—Precision estimated from data reported in "Evaluation of 1989 Chip Seal Test Sections on US95A Between Wabuska and Yerington, Nevada", University of Nevada, Reno report to Nevada Department of Transportation, June, 1991.

11.2 Preliminary testing also suggests that standard deviations will vary depending on whether pre-wet or pre-coated aggregate is used. However, this has not been proven and more research is being done on this subject.
11.3 *Bias*—Since there is no accepted reference material suitable for determining the bias~~ for the procedure for measuring density,~~ no statement on the bias of this test method is being made.

12. Keywords

12.1 aggregate spread; surface treatment