



Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors¹

This standard is issued under the fixed designation D2995; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This practice covers the determination of transverse and longitudinal application rate and residual application rate of asphalt distributors in gallons per square yard (or litres per square metre).

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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. Summary of Practice

2.1 Pre-weighed pads are placed on the surface of the roadway in front of the distributor. The asphalt distributor is driven over the pads while spraying asphalt. For Option A, the pads are immediately removed from the roadway and immediately reweighed. The weight of asphalt applied to the pads is determined by subtraction and the rate of application is calculated. Option B, for emulsified asphalt, includes oven drying the pads to a constant weight to determine the residual asphalt application rate.

NOTE 1—Option B is not to be used for cutback asphalts.

3. Significance and Use

3.1 *Option A*—The transverse and longitudinal application rate and variability in application rate of bituminous material applied to a pavement surface using a bituminous distributor can be estimated using Option A.

3.2 *Option B*—The transverse and longitudinal residual application rate and variability in residual application rate from

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emulsified asphalt applications to a pavement surface using a bituminous distributor can be estimated by using Option B.

4. Apparatus

4.1 *Balance*, sensitive to 0.1 g.

4.2 *Weighing Box or Balance Shield*, required at site for *Option A*, to protect balance from wind when the balance is in use at the project site (see Fig. 1).

4.3 *Balance Table and Work Table*, for weighing.

4.4 *Oven*, for drying the samples for *Option B*, capable of maintaining a temperature of $230 \pm 9^\circ\text{F}$ ($110 \pm 5^\circ\text{C}$).

5. Materials

5.1 *Geotextile Pads (or other durable absorbent pads)*,² weighing a minimum of 8 oz/yd² and measuring 12 in. (304.8 mm) by 12 in. (304.8 mm).

5.2 *Aluminized Duct Tape*, measuring 2 in. (50.8 mm) wide and 6 in. (152.4 mm) long.

5.3 *Butcher Paper #50 (or other durable paper)*,³ measuring approximately 30 in. (762 mm) wide for temporary protection of geotextile pads during calibration.

6. Procedure (Transverse Application Rate)

6.1 Select enough of the geotextile fabric pads so that when placed transversely end-to-end on the roadway a continuous strip is created across the width of the roadway to be sprayed with asphalt.

6.2 Create a loop with the duct tape with the adhesive side facing out. Place two loops of duct tape on one edge of each of the geotextile fabric pads.

6.3 Obtain the weight of the pad and tape assembly to the nearest 0.1 g.

² Non-woven, needle punched, heat fused on one side geotextiles by Phillips Fibers, Monsanto, and Amoco have been found to be suitable materials for this purpose.

³ Butcher paper from Baumann Paper Co., Baumann Rd., Lexington, KY has been found to be suitable for this purpose.



FIG. 1 Weighing Box and Balance

6.4 Place the pad assembly with the tape facing down on the roadway so the taped edge is facing the distributor. Apply pressure to the taped pad to secure it to the roadway. Continue this operation for the remaining pads for the entire width desired for measurement.

6.5 Place two sheets of the butcher paper over the pad assemblies in the area where the distributor tires will fall on the pad assemblies as shown in Fig. 2. These sheets should be positioned so they protect the pad assemblies from damage by the distributor tires as the truck passes over the pad assemblies. The sheets of butcher paper should adhere to the front and rear tires as the distributor passes over the pad assemblies leaving the pad assemblies available to receive the asphalt as it is sprayed onto the roadway surface.

6.6 *Option A*—As soon as the distributor has passed over the calibration pad assemblies, remove each pad assembly from the roadway, remove the tape from the pad, and weigh immediately.⁴

6.7 *Option B*—Dry each pad to a constant weight in an oven maintained at 230 ± 9°F (110 ± 5°C).

6.8 Weigh each pad to the nearest 0.1 g. Record the weight of each pad and the pad position on the roadway on the report form.

⁴ *Option A*—The pads need to be weighed as soon as possible to minimize error due to loss of water or other volatile components.

7. Procedure (Longitudinal Application Rate)

7.1 Prepare the pads and tape assemblies as described in 6.2 through 6.4. Position enough pads edge to edge down the pavement so the application rate in the long direction to be sprayed is covered as shown in Fig. 3. Position the pads so the distributor tires do not come in contact with the pads.

7.2 *Option A*—As soon as the distributor has passed over the pad assemblies, remove each pad assembly from the roadway and weigh immediately.⁴

7.3 *Option B*—Dry each pad to a constant weight in an oven maintained at 230 ± 9°F (110 ± 5°C) prior to weighing.

7.4 Weigh each pad assembly to the nearest 0.1 g. Record the weight of each pad and the position on the report form.

8. Calculation (Transverse Application Rate)

8.1 Subtract the tare weight of each pad assembly from the gross weight of each bituminous coated pad assembly. (Omit any pads not completely covered with bituminous material.)

8.2 Determine the spray rate in gallons per square yard or litres per square metre for each pad assembly as follows:

$$\text{Application Rate, gal/yd}^2 = (A/G) \times 0.000264 \text{ gal/mL} \times 9 \text{ ft}^2/\text{yd}^2 \quad (1)$$

$$\text{Application Rate, l/m}^2 = (A/G) \times 0.001 \text{ L/mL} \times 10.764 \text{ ft}^2/\text{m}^2 \quad (2)$$

where:

A = net weight of bituminous material per pad assembly, g, and

G = specific gravity of bituminous material at spray temperature.

9. Calculation (Longitudinal Application Rate)

9.1 Follow same procedure as 8.1 and 8.2.

10. Estimation of Residual Asphalt Application Rate

10.1 For emulsified asphalt of known residue, the residual asphalt application rate can be determined using calculation results from Sections 8 or 9, or both, and Table 1.

11. Precision

11.1 It is not practicable to specify the precision of the procedure in Practice D2995 for estimating the application rate of bituminous distributors because of the wide variety of apparatus and binders possible.

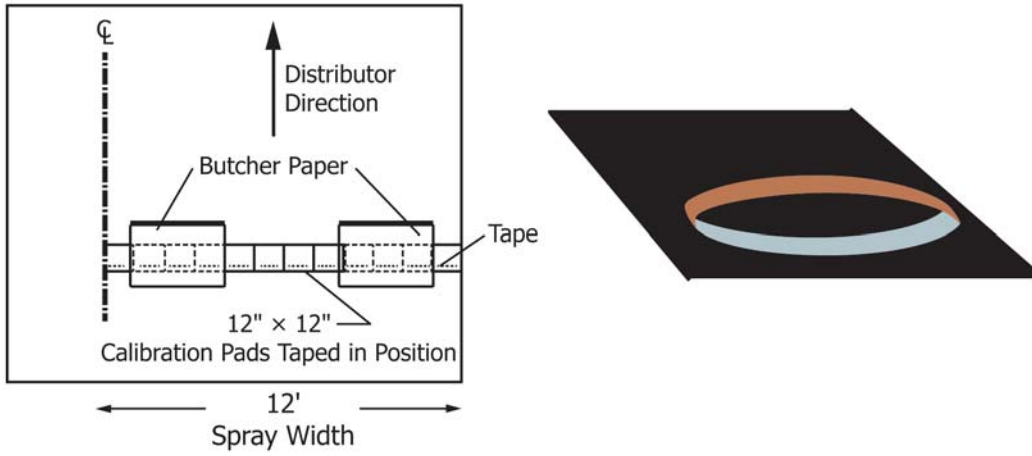


FIG. 2 Position of Pad Assemblies for Transverse Rate Determination and Duct Taped Pad

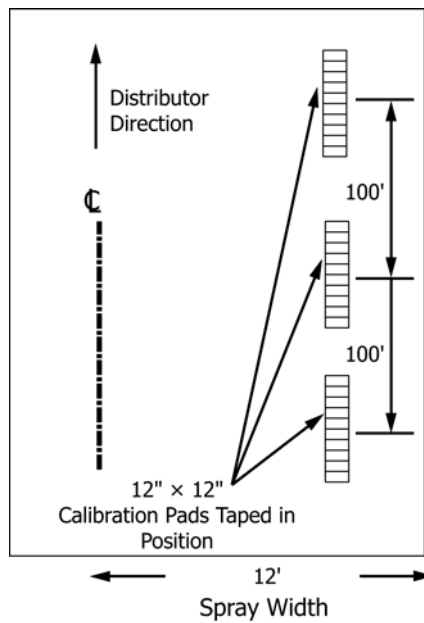


FIG. 3 Position of Pad Assemblies for Longitudinal Rate Determination

TABLE 1 Estimation of Residual Application Rate for Emulsified Asphalt

| Gal/yd ² | Residual Asphalt Application Rate for Emulsified Asphalt of Known Solids | | | | | | | | | | |
|---------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Residual Asphalt Content of Emulsified Asphalt | | | | | | | | | | |
| | 20 % | 25 % | 30 % | 35 % | 40 % | 45 % | 50 % | 55 % | 60 % | 65 % | 70 % |
| 0.05 | 0.010 | 0.013 | 0.015 | 0.018 | 0.020 | 0.023 | 0.025 | 0.028 | 0.030 | 0.033 | 0.035 |
| 0.10 | 0.020 | 0.025 | 0.030 | 0.035 | 0.040 | 0.045 | 0.050 | 0.055 | 0.060 | 0.065 | 0.070 |
| 0.15 | 0.030 | 0.038 | 0.045 | 0.053 | 0.060 | 0.068 | 0.075 | 0.083 | 0.090 | 0.098 | 0.105 |
| 0.20 | 0.040 | 0.050 | 0.060 | 0.070 | 0.080 | 0.090 | 0.100 | 0.110 | 0.120 | 0.130 | 0.140 |
| 0.25 | 0.050 | 0.063 | 0.075 | 0.088 | 0.100 | 0.113 | 0.125 | 0.138 | 0.150 | 0.163 | 0.175 |
| 0.30 | 0.060 | 0.075 | 0.090 | 0.105 | 0.120 | 0.135 | 0.150 | 0.165 | 0.180 | 0.195 | 0.210 |
| 0.35 | 0.070 | 0.088 | 0.105 | 0.123 | 0.140 | 0.158 | 0.175 | 0.193 | 0.210 | 0.228 | 0.245 |
| 0.40 | 0.080 | 0.100 | 0.120 | 0.140 | 0.160 | 0.180 | 0.200 | 0.220 | 0.240 | 0.260 | 0.280 |
| 0.45 | 0.090 | 0.113 | 0.135 | 0.158 | 0.180 | 0.203 | 0.225 | 0.248 | 0.270 | 0.293 | 0.315 |
| 0.50 | 0.100 | 0.125 | 0.150 | 0.175 | 0.200 | 0.225 | 0.250 | 0.275 | 0.300 | 0.325 | 0.350 |
| 0.60 | 0.120 | 0.150 | 0.180 | 0.210 | 0.240 | 0.270 | 0.300 | 0.330 | 0.360 | 0.390 | 0.420 |
| 0.80 | 0.160 | 0.200 | 0.240 | 0.280 | 0.320 | 0.360 | 0.400 | 0.440 | 0.480 | 0.520 | 0.560 |
| 1.00 | 0.200 | 0.250 | 0.300 | 0.350 | 0.400 | 0.450 | 0.500 | 0.550 | 0.600 | 0.650 | 0.700 |
| 1.20 | 0.240 | 0.300 | 0.360 | 0.420 | 0.480 | 0.540 | 0.600 | 0.660 | 0.720 | 0.780 | 0.840 |
| 1.40 | 0.280 | 0.350 | 0.420 | 0.490 | 0.560 | 0.630 | 0.700 | 0.770 | 0.840 | 0.910 | 0.980 |
| 1.60 | 0.320 | 0.400 | 0.480 | 0.560 | 0.640 | 0.720 | 0.800 | 0.880 | 0.960 | 1.040 | 1.120 |
| 1.80 | 0.360 | 0.450 | 0.540 | 0.630 | 0.720 | 0.810 | 0.900 | 0.990 | 1.080 | 1.170 | 1.260 |
| 2.00 | 0.400 | 0.500 | 0.600 | 0.700 | 0.800 | 0.900 | 1.000 | 1.100 | 1.200 | 1.300 | 1.400 |
| 2.20 | 0.440 | 0.550 | 0.660 | 0.770 | 0.880 | 0.990 | 1.100 | 1.210 | 1.320 | 1.430 | 1.540 |
| 2.40 | 0.480 | 0.600 | 0.720 | 0.840 | 0.960 | 1.080 | 1.200 | 1.320 | 1.440 | 1.560 | 1.680 |

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