

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

STANDARD TEST METHOD FOR
MEASURING PAVEMENT MACROTEXTURE DEPTH USING A
VOLUMETRIC TECHNIQUE

1. PURPOSE

- 1.1 This procedure was created in order to aid in the determination of the degree of segregated or flushed asphaltic pavements. It is directly applicable to Section 410 of the West Virginia Standard Specifications.

2. SCOPE

- 2.1 This test method describes a procedure for determining the average depth of pavement surface macrotexture by careful application of a known volume of material (typically glass beads) on the surface and subsequent measurement of the total area and calculation of the average depth between the bottom of the pavement surface voids and the tops of surface aggregate particles. The technique is designed to provide an average depth value of only the pavement macrotexture and is considered insensitive to pavement microtexture characteristics.
- 2.2 The results obtained using this procedure to determine average pavement macrotexture depths do not necessarily agree or correlate directly with those obtained by other pavement macrotexture measuring methods.
- 2.3 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.

3. MATERIALS AND EQUIPMENT

- 3.1 The essential elements of the testing apparatus are shown in Fig. 1 and generally consist of the material and equipment discussed below.
- 3.1.1 *Material* - Solid glass spheres meeting the requirements for a Type 1 pavement marking bead as per AASHTO M-247, *Standard Specification for Glass Beads Used in Pavement Markings*.
- 3.1.2 *Sample Container* - A cylindrical metal or plastic container with a predetermined internal volume of at least 1.5 cubic in. (25,000 mm³) shall be used to determine the volume of sand spread.

- 3.1.3 *Spreader Tool* - A flat, hard disc approximately 1 in. (25 mm) thick and 2.5 to 3.0 in. (60 to 75 mm) in diameter shall be used to spread the material. The bottom surface or face of the disc shall be covered with a hard rubber material and a suitable handle may be attached to the top surface of the disc.

NOTE – A standard ice hockey puck is considered suitable for use as the spreader tool in this test method.

- 3.1.4 *Brushes* - A stiff wire brush and a soft bristle brush shall be used to clean the pavement surface thoroughly prior to application of the material sample. Compressed air may be used as an option for cleaning the surface.
- 3.1.5 *Wind Screen* - A suitable screen or shield shall be placed on the pavement surface to protect the material sample from the wind and turbulence created by traffic.
- 3.1.6 *Length Measuring Scale* - A standard measuring scale 18 in. (458-mm) or greater in length and having 1/16-in. or 1-mm divisions should be used. For better accuracy, measurements in units of the nearest mm are preferred.
- 3.1.7 *Form* – The Form T-434 is available to record the measurements observed. A digital copy of this form is available to also perform the calculations.

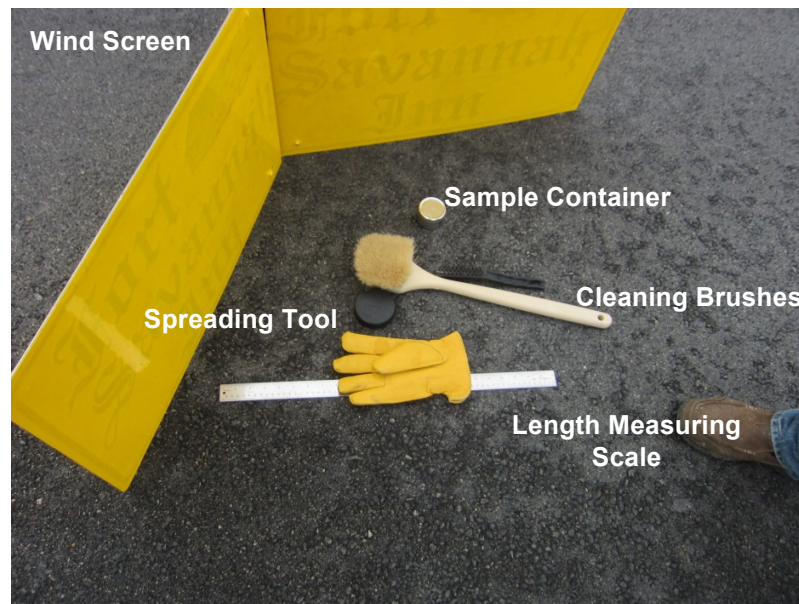


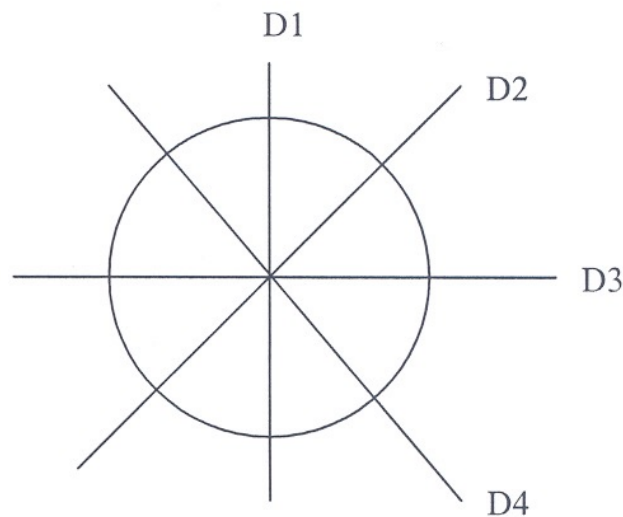
Figure 1
Typical Apparatus for Measuring Surface Macrotexture Depth

4. PROCEDURE

- 4.1 *Test Area*— Inspect the pavement surface to be measured and select a dry, homogeneous area that contains no unique, localized features such as cracks and joints. Thoroughly clean the surface using the stiff wire brush first and subsequently the soft bristle brush to remove any residue, debris, or loosely bonded aggregate particles from the surface. Compressed air may be used to clean and/or dry the

surface after cleaning with the stiff brush. Position the portable wind screen around the surface test area.

- 4.2 *Material Sample*—Fill the cylinder of known volume with dry material by pouring through a small funnel without tapping the sides of the sample container. Add more material to fill the cylinder to overflowing, and strike off once with a straightedge to level the top.
- 4.3 *Test Measurement*—Pour the measured volume of material onto the cleaned surface within the area protected by the wind screen. Carefully spread the material into a circular patch with the disk tool, rubber-covered side down, filling the surface voids flush with the aggregate particle tips. Generally, some light pressure will be needed to spread the material and not leave a layer of material between the aggregate tips and the bottom surface of the spreading tool. However, do not dig the material out of the pavement with the spreading tool or otherwise. Measure and record the diameter of the circular area covered by the material at a minimum of four equally spaced locations around the sample circumference. Compute and record the average diameter.



NOTE: For very smooth pavement surfaces where the patch diameters are greater than 12 in. (305 mm), it is recommended that a smaller, known volume of material be used.

- 4.4 *Number of Test Measurements*—The same operator should perform at least four, randomly-spaced measurements of average macrotexture depth on a given test pavement surface type. The arithmetic average of the individual macrotexture depth values shall be considered to be the average macrotexture depth of the test pavement surface.

5. CALCULATION

- 5.1 *Cylinder Volume*—Calculate the internal volume of the sample cylinder as follows:

$$V = \frac{\pi d^2 h}{4}$$

where:

V = internal cylinder volume, in.³ (mm³),
 d = internal cylinder diameter, in. (mm), and
 h = cylinder height, in. (mm).

- 5.2 *Average Pavement Macrotexture Depth*—Calculate the average pavement macrotexture depth using the following equation:

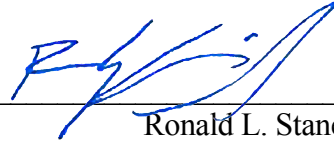
$$AMTD = \frac{4V}{\pi D^2}$$

where:

$AMTD$ = average texture depth of pavement macrotexture, in. (mm),
 V = sample volume, in.³ (mm³), and
 D = average diameter of the area covered by the material, in. (mm).

6. REPORT

- 6.1 The report for each pavement test surface shall contain data on the following items:
- 6.1.1 Location and identification of test pavement surface.
 - 6.1.2 Date.
 - 6.1.3 Volume of material used for each test measurement, in.³ (mm³).
 - 6.1.4 Number of test measurements.
 - 6.1.5 Average diameter of the area covered by the material, in. (mm), for each test.
 - 6.1.6 Average texture depth, in. (mm), for each test.
 - 6.1.7 Average texture depth, in. (mm), for total pavement test surface.



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