



## Standard Practice for Calculating Pavement Macrotexture Mean Profile Depth<sup>1</sup>

This standard is issued under the fixed designation E 1845; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice covers the calculation of mean profile depth from a profile of pavement macrotexture.

1.2 The mean profile depth has been shown to be useful in predicting the speed constant (gradient) of wet pavement friction.<sup>2</sup>

1.3 A linear transformation of the mean profile depth can provide an estimate of the mean texture depth measured according to Test Method E 965.

1.4 The values stated in SI (metric) units are to be regarded as standard. The inch-pound equivalents are rationalized, rather than exact mathematical conversions.

1.5 *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:

E 867 Terminology Relating to Vehicle-Pavement Systems<sup>3</sup>

E 965 Test Method for Measuring Pavement Macrotexture Depth Using a Volumetric Technique<sup>3</sup>

#### 2.2 ISO Standard:

ISO 13473-1 Acoustics—Characterization of Pavement Texture using Surface Profiles—Part 1: Determination of Mean Profile Depth<sup>4</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *baselength, n*—the length of a segment of a pavement macrotexture profile being analyzed, required to be 100 mm in this practice.

3.1.2 *estimated texture depth (ETD), n*—the estimate of the mean texture depth (MTD), by means of a linear transforma-

tion of the mean profile depth (MPD).

3.1.3 *mean profile depth (MPD), n*—the average of all the mean segment depths of all of the segments of the profile.

3.1.4 *mean segment depth, n*—the average value of the profile depth of the two halves of a segment having a given baselength.

3.1.5 *mean texture depth (MTD), n*—the mean depth of the pavement surface macrotexture determined by the volumetric technique of Test Method E 965.<sup>5</sup>

3.1.6 *profile depth (PD), n*—the difference between the amplitude measurements of pavement macrotexture and a horizontal line through the top of the highest peak within a given baselength.

### 4. Summary of Practice

4.1 This practice uses a measured profile of the pavement macrotexture.

4.2 The measured profile is divided for analysis purposes into segments each having a baselength of 100 mm (3.9 in.). The slope, if any, of each segment is suppressed by subtracting a linear regression of the segment. The segment is further divided in half and the height of the highest peak in each half segment is determined. The difference between that height and the average level of the segment is calculated. The average value of these differences for all segments making up the measured profile is reported as the MPD.

### 5. Significance and Use

5.1 This practice is suitable for the calculation of the average macrotexture depth from profile data. The results of this calculation (MPD) have proven to be useful in the prediction of the speed dependence of wet pavement friction.<sup>2</sup>

5.2 The MPD can be used to estimate the result of a measurement of macrotexture depth using a volumetric technique according to E 965. The values of MPD and MTD differ due to the finite size of the glass spheres used in the volumetric technique and because the MPD is derived from a two-dimensional profile rather than a three-dimensional surface. Therefore a transformation equation must be used.

5.3 This practice may be used with pavement macrotexture profiles taken on actual road surfaces or from cores or laboratory prepared samples.

<sup>1</sup> This practice is under the jurisdiction of Committee E17 on Vehicle-Pavement Systems and is the direct responsibility of Subcommittee E17.23 on Surface Characteristics Related to Tire Pavement Slip Resistance.

Current edition approved June 10, 2001. Published September 2001.

<sup>2</sup> Wambold, J. C., Antle, C. E., Henry, J. J., and Rado, Z., International PIARC Experiment to Compare and Harmonize Texture and Skid Resistance Measurements, Final report, *Permanent International Association of Road Congresses* (PIARC), Paris 1995.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.03.

<sup>4</sup> Available from International Organization for Standardization, 1, rue de Varembe, Case Postale 56, CH-1211 Geneva 20, Switzerland.

<sup>5</sup> In the Test Method E 965, the mean texture depth is reported as MATX<sub>g</sub>. In this practice it will be reported as MTD, which has more widespread use. The two terms are intended to be equivalent.