



Designation: E1364 – 95 (Reapproved 2017)

Standard Test Method for Measuring Road Roughness by Static Level Method¹

This standard is issued under the fixed designation E1364; 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 covers the measurement of a longitudinal profile of a travelled surface using a static level for the purpose of obtaining a road roughness index. This test method is suitable for all surface types that are travelled by conventional ground vehicles, including paved and unpaved roads.

1.2 This test method is labor intensive with respect to other means for measuring longitudinal profile, and is used mainly for (1) validating other profile-measuring methods and (2) calibrating response-type roughness-measuring systems.

NOTE 1—When measuring road roughness with a static level for the purposes of validating other profile-measuring methods or calibrating response-type roughness-measuring systems, the static level measurement process should be evaluated to ensure the measurements are within the resolution required in Table 1. It is recommended that several locations be marked at various distances from the level and these locations be measured in sequence several times to establish if the readings stay within the resolution required. Wind, distance between the rod and the level, surface texture, and positioning of the rod all have significant impact on the repeatability of the elevation measurements. Any variation from the true elevations will primarily affect the bias as explained in 10.2. To determine the effect of random variations, random variations can be added to an existing profile and the IRI recalculated to determine the impact of the variations.

1.3 This test method describes the computation required for one particular type of roughness index, the vehicle simulation used in the International Roughness Index (IRI). Additionally, the profile obtained with this test method can be processed to obtain other roughness measures.

1.4 This test method includes two levels of accuracy that can be chosen according to need. The more accurate, designated as Class 1, reduces the measurement error of the roughness index to less than 2 % of the true value of the index. The second, designated as Class 2, involves errors less than 5 %.

1.5 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.

1.6 *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.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

E950 Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference

E1082 Test Method for Measurement of Vehicular Response to Traveled Surface Roughness

E1170 Practices for Simulating Vehicular Response to Longitudinal Profiles of Traveled Surfaces

3. Summary of Test Method

3.1 Measures of surface elevation are obtained at constant intervals along a line on a travelled surface to define a longitudinal profile. The line used for the profile is called a wheeltrack, a path followed by the tire of a road vehicle. The measured numbers are recorded and entered into a computer for graphical display and analysis. The profile points are used as input to a computational algorithm that produces a summary roughness index.

3.2 This test method describes the use of conventional survey equipment comprising an optical level and graduated rod, but it may also be applied to automated techniques (for example, laser-based systems) with appropriate adjustments. At a minimum, two persons are required; one to locate and

¹ This test method is under the jurisdiction of ASTM Committee E17 on Vehicle - Pavement Systems and is the direct responsibility of Subcommittee E17.31 on Methods for Measuring Profile and Roughness.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.