



Standard Practice for Computing International Roughness Index of Roads from Longitudinal Profile Measurements¹

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1. Scope

1.1 This practice covers the mathematical processing of longitudinal profile measurements to produce a road roughness statistic called the International Roughness Index (IRI).

1.2 The intent is to provide a standard practice for computing and reporting an estimate of road roughness for highway pavements.

1.3 This practice is based on an algorithm developed in The International Road Roughness Experiment sponsored by a number of institutions including the World Bank and reported in two World Bank Technical Papers (1, 2).² Additional technical information is provided in two Transportation Research Board (TRB) papers (3, 4).

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

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:³

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E867 Terminology Relating to Vehicle-Pavement Systems

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

¹ This practice is under the jurisdiction of ASTM Committee E17 on Vehicle - Pavement Systems and is the direct responsibility of Subcommittee E17.33 on Methodology for Analyzing Pavement Roughness.

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² The boldface numbers given in parentheses refer to a list of references at the end of the text.

³ 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.

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

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

E1215 Specification for Trailers Used for Measuring Vehicular Response to Road Roughness

E1364 Test Method for Measuring Road Roughness by Static Level Method

E1656 Guide for Classification of Automated Pavement Condition Survey Equipment

E2133 Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

3. Terminology

3.1 Definitions:

3.1.1 Terminology used in this practice conforms to the definitions included in Terminology E867.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *International Roughness Index (IRI)*, *n*—an index computed from a longitudinal profile measurement using a quarter-car simulation (see Practice E1170) at a simulation speed of 80 km/h (50 mph).

3.2.1.1 *Discussion*—IRI is reported in either metres per kilometre (m/km) or inches per mile (in./mile). (Note—1 m/km = 63.36 in./mile.)

3.2.2 *longitudinal profile measurement*, *n*—a series of elevation values taken at a constant interval along a wheel track.

3.2.2.1 *Discussion*—Elevation measurements may be taken statically, as with rod and level (see Test Method E1364) or inclinometer (see Test Method E2133), or dynamically, as with an inertial profiler (see Test Method E950).

3.2.3 *Mean Roughness Index (MRI)*, *n*—the average of the IRI values for the right and left wheel tracks.

3.2.3.1 *Discussion*—Units are in metres per kilometre or inches per mile.

3.2.4 *traveled surface roughness*—the deviations of a surface from a true planar surface with characteristics dimensions that affect vehicle dynamics, ride quality, dynamic loads, and drainage, for example, longitudinal profile, transverse profile, and cross slope.