



Standard Practice for Computing Wheelchair Pathway Roughness Index as Related to Comfort, Passability, and Whole Body Vibrations from Longitudinal Profile Measurements¹

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ε¹ NOTE—Corrected 5.1.1 editorially in October 2016.

1. Scope

1.1 This practice covers the mathematical processing of longitudinal profile measurements to produce a wheelchair pathway roughness statistic called the Wheelchair Pathway Roughness Index (WPRI).

1.2 This provides a standard practice for computing and reporting an estimate of pathway roughness for sidewalks and other pedestrian surfaces.

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

1.4 *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:*²

E867 Terminology Relating to Vehicle-Pavement Systems
E1364 Test Method for Measuring Road Roughness by Static Level Method

E1926 Practice for Computing International Roughness Index of Roads from Longitudinal Profile Measurements

E1927 Guide for Conducting Subjective Pavement Ride Quality Ratings

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

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 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.

3. Terminology

3.1 *Definitions:*

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

3.1.1.1 *Discussion*—Elevation measurements may be taken statically, as with rod and level per Test Method E1364 or dynamically using a rolling inclinometer per Test Method E2133.

3.1.2 *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.

3.1.3 *wave number, n*—the inverse of wavelength.

3.1.3.1 *Discussion*—Wave number, sometimes called spatial frequency, typically has units of cycle/m or cycle/ft.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *Wheelchair Pathway Roughness Index (WPRI), n*—an index computed from a longitudinal profile measurement using a standard 70 mm (2.5 in.) diameter wheel with no deformation and no affects from speed. The index represents the total vertical deflection of that wheel as it travels over a surface.

3.2.1.1 *Discussion*—WPRI is reported in either millimeters per meter (mm/m) or inches per foot (in./ft).

3.2.2 *Mean Wheelchair Pathway Roughness Index (MWPRI), n*—the average of the WPRI values for multiple trials expressed in millimeters per meter or inches per foot.

3.2.3 *True Wheelchair Pathway Roughness Index, n*—the value of WPRI computed for a longitudinal profile measurement with the constant interval approaching zero.

3.2.4 *wheel path, n*—a line or path followed by a non-deformable tire of a wheeled vehicle on a traveled surface as it approaches zero speed.

4. Summary of Practice

4.1 This practice was developed specifically for estimating wheelchair pathway roughness from longitudinal profile measurements.