



Standard Test Method for Speed and Distance Calibration of a Fifth Wheel Equipped With Either Analog or Digital Instrumentation¹

This standard is issued under the fixed designation F 457; 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 determination of vehicle speed and cumulative distance traveled using a device termed a fifth wheel and using appropriate associated instrumentation.

1.2 This test method also describes the calibration technique applicable to digital or analog speed and distance measurement systems employing a fifth wheel.

1.3 The values stated in SI (millimeter-kilogram) units are to be regarded as the standard.

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.* For specific precautionary statements, see Section 6.

2. Referenced Documents

2.1 *ASTM Standards:*

F 1082 Practice for Tires—Determining Precision for Test Method Standards²

3. Summary of Test Method

3.1 Vehicle speed and distance determinations are made by use of a fifth wheel, signal transducer(s), and compatible display devices.

3.2 The fifth wheel assembly and signal transducer(s) are attached to the vehicle or the test trailer so that the fifth wheel remains in contact with the normal roadway surface while the equipment is in motion. The rotation of this wheel is detected in a suitable manner and is translated into measurements of vehicle speed and distance with auxiliary equipment.

3.3 The speed is to be communicated to the vehicle operator at all times, and should be visible without undue distraction or a requirement for physical movement on the part of the operator.

3.4 Fifth wheel calibration is performed by operating the device at a fixed speed over a known distance and comparing

the speed and distance readout to a known speed and distance.

4. Significance and Use

4.1 This test method may be used for calibration of speed and distance measurement systems used on tire test vehicles and tire test trailers, or any land-based vehicle that contacts the road and which uses a trailing-wheel system for measurement of speed and distance. This test method applies only to hard, dry, smooth surfaces and is not accurate for highly curved vehicle paths. This test method does not encompass optical types of devices.

5. Apparatus

5.1 *Fifth Wheel*—The fifth-wheel assembly shall be of sufficient mechanical integrity to withstand long periods of sustained operation with minimal maintenance. The wheel vertical pivot assembly shall be sufficient to permit directional changes without inducing lateral skidding of the fifth-wheel tire. The fifth-wheel assembly shall be equipped with a suspension capable of minimizing bounce and wheel hop, due to roadway irregularities, to the extent necessary to ensure measurement accuracy. The wheel shall be equipped with a suitable tire, preferably of a straight-ribbed design. The tires shall have a minimum (new) size of 349–37 ($16 \times 1\frac{3}{8}$). Tire and wheel shall be balanced statically each time the tire is replaced.

5.2 *Instrumentation*—Fifth-wheel systems shall be equipped with either analog or digital instrumentation for determining wheel rotation. Suitable readouts shall be provided.

5.2.1 *Analog Instrumentation:*

5.2.1.1 *Generator (tachometer)*—The generator shall be coupled to the fifth wheel to produce an electrical output proportional to the angular velocity (converted into linear velocity expressed in km/h (mph)) of the fifth wheel. The generator output shall be continuously proportional to the rotational velocity within the required tolerance. The generator output shall be biased after engineering unit conversion by an amount less than or equal to 0.5 % of the converted speed, or 0.3 km/h (0.2 mph), whichever is greater. The generator response to changes in speed shall not exceed 0.5 s throughput. Generator operation shall not be degraded by direct or condensed moisture, road film, petroleum residue, dust, salt, or

¹ This test method is under the jurisdiction of ASTM Committee F09 on Tires and is the direct responsibility of Subcommittee F09.10 on Equipment, Facilities, and Calibration.

Current edition approved Feb. 15, 1994. Published May 1994. Originally published as F 457 – 76. Last previous edition F 457 – 86.

² *Annual Book of ASTM Standards*, Vol 09.02.