

(R) TEST PROCEDURE FOR PARKING STABILITY OF MOTORCYCLES

1. **Scope**—Side stands and center stands are designed to support stationary two wheel motorcycles. This SAE Recommended Practice establishes procedures for determining parking surface loading and stability limits as follows:
 - a. The footprint pressure exerted on a horizontal parking surface by the stand.
 - b. The tilt angle of the parking surface at which tip-over occurs.
 - c. The tilt angle of the parking surface at which roll-off occurs.
2. **References**
 - 2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein. Unless otherwise specified, the latest issue of SAE publications shall apply.
 - 2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J213—Definitions—Motorcycles
SAE J1248—Performance Requirements for Parking Stability of Motorcycles
3. **Definitions**
 - 3.1 **Side Stand**—A retractable device which supports a stationary motorcycle by leaving both tires in contact with the parking surface and providing a third contact area with the parking surface on only one side of the motorcycle longitudinal plane of symmetry.
 - 3.2 **Center Stand**—A retractable device which supports a stationary motorcycle by providing two or more contact areas between the stand and parking surface, with at least one contact area on each side of the motorcycle longitudinal plane of symmetry. The center stand may support the motorcycle entirely, or in conjunction with one or both tires.
 - 3.3 **Parking Surface**—A rigid flat plane which supports the tested motorcycle. The surface shall have a friction coefficient and/or texture sufficient to preclude sliding of the side or center stand along the surface when performing the tests in 5.1.
 - 3.4 **Stand Contact Pad Area**—Area of stand contact pad as determined by the procedure described in 5.2.2 and illustrated in Figure 1.

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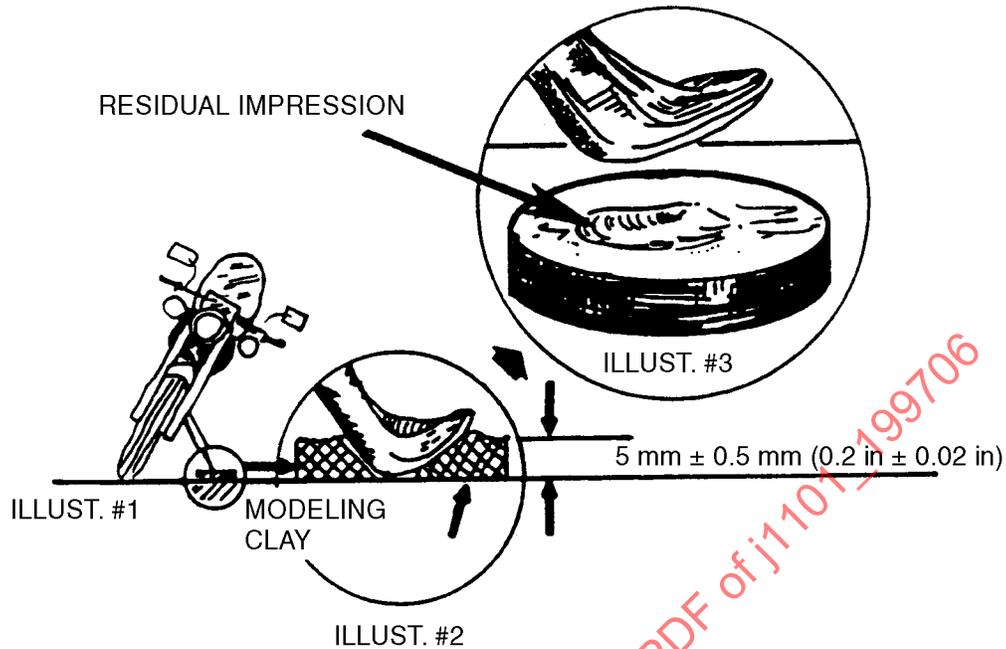


FIGURE 1—SIDE STAND FOOTPAD SURFACE CONTACT DETERMINATION

- 3.5 Stand Contact Pad Pressure**—Force exerted on the parking surface per unit stand contact pad area when the motorcycle is parked, as computed in 5.2.3.
- 3.6 Tip-Over Angle**—When tilting the parking surface about a horizontal axis parallel to the longitudinal plane of symmetry of the motorcycle, the smallest angle of parking surface tilt measured from the horizontal in either direction, at which the normal force between any of the motorcycle contact points (stand or tire) and the parking surface becomes zero. (See Table 1 of SAE J1248.)
- 3.7 Roll-Off Angle**—When tilting the parking surface forward about a horizontal axis perpendicular to the motorcycle longitudinal plane of symmetry, the smallest angle of parking surface tilt, measured from the horizontal, at which the side stand or center stand fully retracts unassisted. (See Table 2 of SAE J1248.)
- 3.8 Designated Parked Steering Position**—The designated parked steering position shall be the position recommended in the owner's manual or the position at which the steering can be locked to prevent it from rotating.
- 3.9 Longitudinal Plane of Symmetry**—A vertical plane as defined in SAE J213.

4. Test Configuration

- 4.1** The motorcycle shall be parked on the parking surface using the stand to be tested. Stand(s) not to be tested shall be in the fully retracted position.
- 4.2** The motorcycle shall be at curb weight (see SAE J213).
- 4.3** The tire pressures shall be set at the manufacturer's recommendation for a single rider.
- 4.4** The suspension adjustment shall be set to the minimum recommended ride height setting.

- 4.5 The transmission shall be in neutral for all roll-off tests and in drive gear for all tip-over tests. For motorcycles which would roll during the tip-over test with the transmission in gear, a brake which will prevent the motorcycle from rolling shall be applied.
- 4.6 The motorcycle's longitudinal plane of symmetry shall be aligned parallel to the longitudinal axis of the parking surface within 0.5 degree. For side stand tests, alignment shall be established with the motorcycle standing vertically on its wheels prior to leaning it onto the side stand or rotating its steering for tests. For center stand tests, alignment shall be established with the motorcycle placed on the center stand prior to rotating its steering for tests.
- 4.7 The motorcycle shall be parked on the parking surface with its steering positioned at the designated parked steering position. If a designated parked steering position does not exist, tests shall be conducted with the steering turned to both right and left maximum angles.
- 4.8 The steering shall be free to rotate about its axis. When a steering parking lock is provided, tests may also be performed with the steering fastened into position with the lock.
- 4.9 Restraints should be provided to prevent the motorcycle from falling when the limits of its parking stability have been exceeded. The restraints shall in no way support the motorcycle within its limits of parking stability.

5. Procedures

5.1 Roll-Off and Tip-Over Angle Determinations

- 5.1.1 TIP-OVER TEST—For every test configuration defined in Section 4, the parking surface shall be tilted to the right and left of the motorcycle thus determining the right and left tip-over angle.
- 5.1.2 ROLL-OFF TEST—For every test configuration defined in Section 4, the parking surface shall be tilted forward out of its horizontal plane, thus determining the roll-off angle.
- 5.1.3 The result of each test of each configuration shall be recorded to the nearest one-half degree (0.5 degree). Testing shall continue for each configuration until three measurements within a range of 1 degree have been obtained. The reported value for the configuration shall be the average of the three measurements within 1 degree.

5.2 Stand Contact Pressure Measurement

- 5.2.1 FORCE MEASUREMENT—The force applied by each stand contact pad shall be determined by installing an appropriate force measurement device flush into the horizontal parking surface, and placing each stand contact pad separately on the device while the motorcycle is parked on the stand. The measurement device shall be of sufficient size to support the entire stand contact pad being evaluated and shall measure the force with an accuracy of ± 2.2 N (± 0.5 lbf). The device shall be oriented to measure the force component normal (perpendicular) to the parking surface.
- 5.2.2 STAND CONTACT PAD AREA MEASUREMENT—The area of contact of each contact pad with the parking surface shall be determined by making an imprint of the pad in a layer of an inelastic solid (e.g., modeling clay). A layer of the inelastic material $5 \text{ mm} \pm 0.5 \text{ mm}$ ($0.2 \text{ in} \pm 0.02 \text{ in}$) thick shall be placed on the parking surface, and each stand contact pad shall be positioned on this material while the motorcycle is parked. The pad shall fully penetrate the inelastic material and contact the parking surface as in Figure 1. The measured area of the imprint at the upper surface of the inelastic material shall be the area for that stand contact pad.
- 5.2.3 PRESSURE COMPUTATION—The contact pressure for each stand contact pad shall be the applied force measured in 5.2.1 divided by the contact area measured in 5.2.2 (see SAE J1248).

6. **Notes**

- 6.1 **Marginal Indicia**—The change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE MOTORCYCLE COMMITTEE

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