

	SURFACE VEHICLE RECOMMENDED PRACTICE	SAE J2530	REV. MAY2008
		Issued 2004-03 Revised 2008-05	
		Superseding J2530 MAR2004	
Aftermarket Wheels—Passenger Cars and Light Truck— Performance Requirements and Test Procedures			

RATIONALE

The wheel performance can change if the wheel is chrome plated. Generally the fatigue performance will be equal or lower than the unplated version and the impact resistance can change with the plating process. Therefore, it is necessary to revise the document to clarify how to select plated wheels and verify that cracks in the plating only are not failures. The questions on how the wheel manufacturer determines if the crack is through a section of the wheel is left to several analytical methods but does not need to be specified in this document. The Wheel Committee reviewed the plated options used in the aftermarket and concluded that we should add a general statement on finishes that require the wheel manufacturer to test the worst case. The focus on chrome works for OEM wheels but the many finishes used currently and potentially in the future make it important that all be evaluated.

1. SCOPE

This SAE Recommended Practice provides performance and sampling requirements, test procedures, and marking requirements for aftermarket wheels intended for normal highway use on passenger cars, light trucks, and multipurpose passenger vehicles. For aftermarket wheels on trailers drawn by passenger cars, light trucks or multipurpose vehicles, see SAE J1204. These performance requirements apply only to wheels made of materials included in Table 1 and Table 2. New nomenclature and terms are added to clarify wheel constructions typically not used in OEM applications. The testing procedures and requirements are based on SAE standards listed in the references.

2. REFERENCES

2.1 Applicable Publications

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

- SAE J175 Wheels—Impact Test Procedures—Road Vehicles
- SAE J179 Labeling—Disc Wheels and Demountable Rims—Trucks
- SAE J328 Wheels—Passenger Car and Light Truck Performance Requirements and Test Procedures
- SAE J1204 Wheels—Recreational and Utility Trailer Test Procedure
- SAE J1982 Nomenclature—Wheels for Passenger Cars, Light Trucks, and Multipurpose Vehicles

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2.1.2 Tire and Rim Association Publication

Available from Tire and Rim Association, 175 Montrose West Avenue, Suite 150, Copley, OH 44321.

Yearbook, The Tire and Rim Association, Inc.

2.2 Relationship of SAE Standard to ISO Standard

The following ISO standards provide test specifications for wheels which are comparable to this standard.

ISO 3006:1995 Road Vehicles—Passenger Car Wheels—Test Methods

ISO 7141:1995 Road Vehicles—Impact Test Procedure

ISO 3894:1995 Road Vehicles—Truck Wheels/Rims—Test Methods

3. DEFINITIONS

3.1 Aftermarket Wheel

The classification used for wheels generally designed for fitment to multiple vehicle applications that may be sold to the general public subsequent to the initial purchase of such vehicles. Aftermarket wheels are sold as an intended replacement of OEM wheels provided for said vehicles.

3.2 Functional Fastener

A connection device such as a bolt, rivet or wire spoke used to join together the individual components of the wheel assembly.

3.3 Lug Nut/Bolt

Hardware designed for securing the wheel to the vehicle.

3.4 Offset

The inset, zerset or outset of the wheel as defined in SAE J1982 Figure 3.

3.5 Wheel Load

The maximum load rating of the wheel as specified by the wheel manufacturer and shall be no less than one-half of the vehicle static load of the heaviest axle (as specified by the vehicle manufacturer) of any vehicle for which the wheel is intended (as determined by the wheel manufacturer)

4. WHEEL MARKINGS

Wheels that comply with this specification must be permanently marked with the following information. The characters shall be legible and the character size shall not be less than 3.2 mm (.12 in).

4.1 Wheel manufacturer's name, trademark or symbol.

4.2 Date of manufacture of the wheel, indicating the month and year, which may be either coded or specifically indicated.

4.3 Manufacturer's part number or code.

4.4 Country of manufacture.

- 4.5 Rim size designation – Rim diameter and width.
- 4.6 The manufacturer's wheel load rating as established by design validation testing to this specification expressed in lbs or kg.
- 4.7 The largest overall diameter of an installed tire at its maximum rated inflation pressure, per wheel manufacturer recommendation expressed in inches or mm.
- 4.8 If the wheel manufacturer recommends restricting wheel use with certain types of tires then the finished wheel must be permanently marked with the restriction, for example "Not for Use with Radial Tires".
- 4.9 The symbol "DOT", constituting a certification by the manufacturer of the rim that the rim complies with all applicable motor vehicle safety standards.

Following the symbol, "DOT", a designation which indicates the source of rim's published nominal dimensions as follows:

- "T" indicates The Tire and Rim Association, Inc.
"E" indicates The European Tyre and Rim Technical Organisation
"J" indicates Japan Automobile Tire Manufacturers Association, Inc.
"D" indicates Deutsche Industrie Norm
"B" indicates British Standards Institution
"S" indicates Scandinavian Tire and Rim Organization
"A" indicates Tyre and Rim Association of Australia

- 4.10 "SAE J2530" shall be cast in, stamped on, or labeled on wheels that conform to this specification.

5. WHEEL QUALIFICATION

When possible, test samples must pass through all of the processes to duplicate the effects and/or characteristics of the final product.

5.1 Test Sample Selection

Test samples shall be representative of wheels produced or to be produced.

5.2 Sample Size for Tests

The sample size for the Dynamic Cornering fatigue test (Section 6) are shown in Table 1 and for the Dynamic Radial fatigue test (Section 7) are shown in Table 2. The sample size shown is between 2 and 7 wheels with the appropriate minimum cycles requirements for that sample size. The cycles are based on the material fatigue curves and use Weibull statistics with a reliability of 90%, a confidence level of 50%, and a beta (slope) of 2. Any combination is acceptable as long as the minimum cycles for all sample wheels are reached.

The sample size for the Impact test (Section 8) is 2 wheels.

5.3 Retest and Additional Model Variation Requirements

Changes in either style, diameter, material, increase in wheel load rating, cross sectional dimensions, maximum tire diameter, rim offset, or functional fasteners will require retesting.

For wheels that vary only in finish, it is required to test the wheel with the greatest potential for non-compliance.

For wheels that vary only in width and offset, it is required to test the model variations with the mathematically highest bending moment and include test samples per Section 5 with the largest bolt circle and test samples per Section 5 with the smallest bolt circle and least number of lug holes.

5.4 Inspection of Test Samples

Visual inspection for crack identification shall be executed via corrected 20/20 vision without optical assistance. Dye penetrant inspection for crack verification is recommended, however is not mandatory.

5.5 Acceptance Criteria

Wheels conform to the specification if they meet the acceptance criteria for the testing specified in Sections 6, 7, and 8.

6. DYNAMIC CORNERING FATIGUE

6.1 Performance Requirements

The test wheels, when submitted to the following test procedures, shall meet the minimum performance requirement as specified in Table 1.

6.2 Equipment

See SAE J328.

6.3 Procedure

See SAE J328.

6.4 Bending Moment

Calculate the bending moment (Force x Load Arm Length) to be applied to the test wheel as follows.

$$M = W (R\mu + d) S \quad (\text{Eq. 1})$$

Where:

W = Load rating of the wheel as specified by the wheel manufacturer.

R = One half of the largest overall diameter of the tires to be used on the wheel as specified by the current Tire and Rim Association yearbook or the vehicle/wheel manufacturer.

μ = Coefficient of friction developed between the tire and the road. Use $\mu = 0.7$.

d = The inset or outset of the wheel (offset): use positive sign for inset and negative sign for outset.

S = Load factor – See Table 1. Use one of the factors for the type of wheel being tested.

NOTE: When calculating the Bending Moment, all units of measurement must be of the same system.

6.5 Test Criteria/Test Termination

6.5.1 Acceptance Criteria

The wheel conforms to this test if all the elements of wheel qualification in Section 5 are used and the samples under test must complete the minimum number of test cycles for the sample size used without termination.

6.5.2 Test Termination

Terminate the test when any of the following conditions occur.

- a. Wheel exceeds the initial deflection at point of load application by 20%.

- b. A visually detected crack penetrating through a section of the wheel in the base metal or propagation of any existing fracture/crack resulting in a fatigue crack penetrating through any section of the wheel at the minimum cycles for the sample size used specified as in Table 1. Inspection should be done at the minimum cycles for the sample size used in Table 1. Cracking in the wheel finish alone shall not be the basis for finding a test termination.
- c. One or more lug nuts loosening to less than 60% of the initial torque at the minimum cycles for the sample size used as specified in Table 1. If loosening is due to broken wheel bolts, studs or nuts see 6.5.2e. Inspection should be done at the minimum cycles for the sample size used as specified in Table 1.
- d. Break or crack of a functional fastener.
- e. Broken lug bolts or other parts of the test fixture do not require test termination but may result in damage to the wheel and test invalidation.

7. DYNAMIC RADIAL FATIGUE

7.1 Performance Requirements

The test wheels, when submitted to the following test procedures, shall meet the minimum performance requirements as specified in Table 2.

7.2 Equipment

See SAE J328.

7.3 Procedure

See SAE J328.

7.4 Radial Load

The radial load to be applied to the wheel shall be determined as follows.

$$F = WK \quad (\text{Eq. 2})$$

Where:

F = Radial load.

W = Load rating of the wheel as specified by the wheel manufacturer.

K = Load factor – See Table 2. Use one of the factors for the type of wheel being tested.

NOTE: When calculating the Radial Load, all units of measurement must be of the same system.

7.5 Test Criteria/Test Termination

7.5.1 Acceptance Criteria

The wheel conforms to this test if all the elements of wheel qualification in Section 5 are used and the samples under test must complete the minimum number of test cycles without termination.

7.5.2 Test Termination

Terminate the test when any of the following conditions occur.

- a. Inability of the wheel to sustain the test load.