Designation: E 501 – 94 (Reapproved 2000)

Standard Specification for Standard Rib Tire for Pavement Skid-Resistance Tests[1]

This standard is issued under the fixed designation E 501; 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 specification covers the general requirements for the standard rib tire for pavement skid-resistance testing. The tire covered by this specification is for use in evaluation of tire-pavement friction.

1.2 The terminology in this specification is consistent with Terminology E 867.

1.3 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:*

D 297 Test Methods for Rubber Products—Chemical Analysis[2]

D 412 Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers—Tension[2]

D 1054 Test Method for Rubber Property Resilience Using a Rebound Pendulum[2]

D 1765 Classification System for Carbon Blacks Used in Rubber Products[2]

D 2240 Test Method for Rubber Property—Durometer Hardness[2]

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets[2]

E 867 Terminology Relating to Traveled Surface Characteristics[3]

3. Materials and Manufacture

3.1 The individual standard tires shall conform to the design standards of Section 5. Dimensions, weights, and permissible variations are given in Section 6 and in Fig. 1 and Fig. 2.

3.2 Tread compounding, fabric processing, and all steps in tire manufacturing shall be certified to ensure that the specifications are met.

3.3 A small raised guideline shall be molded on the tire shoulder area to provide a rapid visual check as to whether the maximum wear level for testing has been reached. Tires should actually be removed from service as recommended in 11.5. The marking on the tire, as suggested in Fig. 1, and curb ribs shall be molded on both sides of the tire.

3.4 Fig. 1 is a photograph of the standard tire, and Fig. 2 is a cross section of a typical tire.[4]

4. Material Requirements

4.1 The compounding requirements for the tread compound are given in Table 1.

4.2 *Fabric*—The fabric shall be polyester body or carcass plies and fiber glass belt plies.

NOTE 1—Certain proprietary products have been specified since exact duplication of properties of the finished tire may not be achieved with other similar products. This inclusion does not in any way comprise a recommendation for these proprietary products nor against similar products of other manufacturers, nor does it imply any superiority over any such similar products.

5. Physical Requirements

5.1 The physical and mechanical test requirements are given in Table 2.

6. Dimensions, Weights, and Permissible Variations

6.1 *General*—Details of dimensions are listed as follows and are shown in Fig. 2. When tolerances are not specified, tire dimensions are subject to manufacturer's normal tolerances.

6.1.1 *Construction*— The tire shall be a size G78-15 tubeless type, belted bias construction (two body plies plus two belt plies). The tread width shall be 5.85 in. (148.6 mm) and the cross-sectional tread radius shall be 15.50 ± 2.0 in. (393.7± 50.8 mm). The tire shall have a recommended cross-section width of 8.35 in. (212.1 mm) and a recommended section height of 6.34 in. (161.0 mm) when mounted on a Tire and Rim Association 15 by 6JJ rim. The cured crown angles shall be 33 ± 2° for the body plies, and 27 ± 2° for the belt plies.

6.1.2 *Ribs*—The tire shall have seven plain ribs of 0.66 in. (16.8 mm) width each. Both sides of the shoulder ribs shall be parallel from the tread surface down to a depth equal to the wear guideline.

6.1.3 *Grooves*—The tire shall have six straight grooves of 0.20 in. (5.08 mm) width each. Each groove shall be parallel to the radius of the tread-radius arc and shall have a full radius at the bottom of the groove. Each groove shall have a uniform

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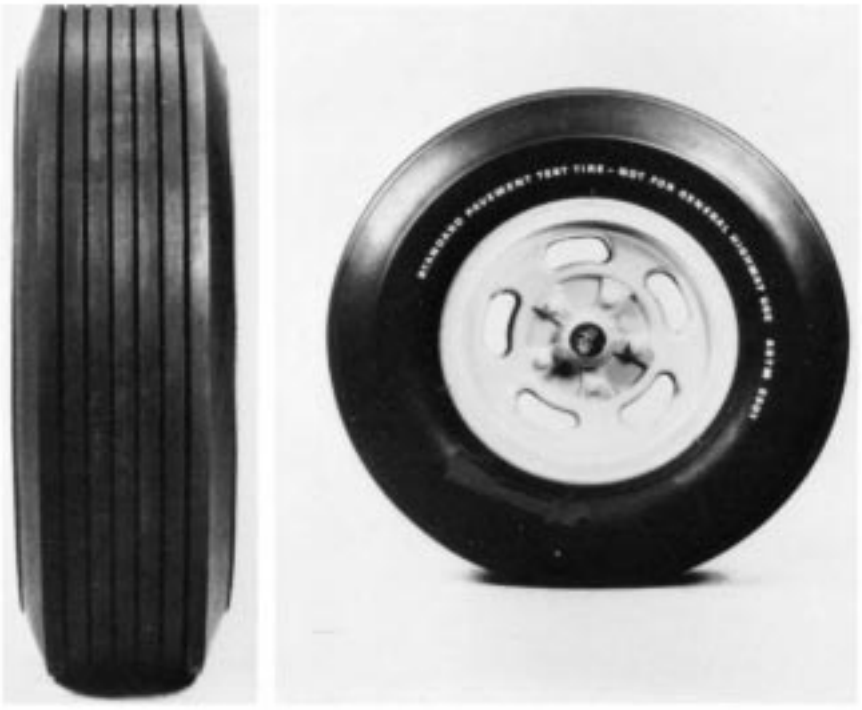
[2] *Annual Book of ASTM Standards*, Vol 09.01.

[3] *Annual Book of ASTM Standards*, Vol 04.03.

[4] ASTM E 501 tire is available from Specialty Tires of America, P.O. Box 749, 1600 Washington St., Indiana, PA 15701.



Marking on Tire
G 78–15
Standard Pavement Test Tire—Not for General Highway Use
ASTM Designation: E 501
Manufacturer's Name or Trademark
Rim: 15x6JJ

FIG. 1 Test Tire

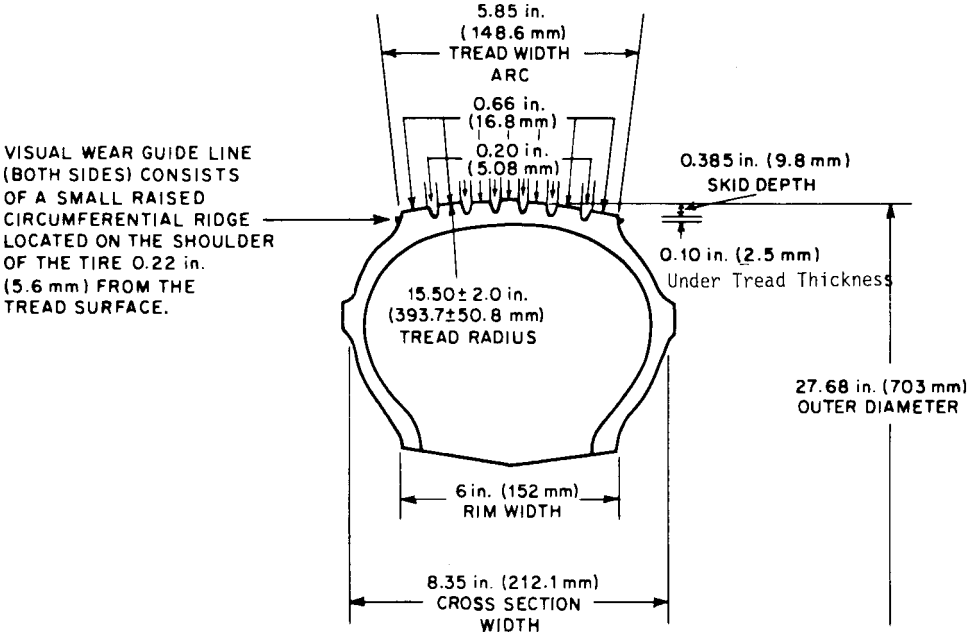


FIG. 2 Tire Section, Including Inflated Tire Dimensions

skid depth of 0.385 in. (9.8 mm) maximum and shall have an under-tread thickness of 0.10 in. (2.5 mm).

6.1.4 *Wear Indicators*— There shall be six rows of tread wear indicators spaced uniformly around the tire circumference and directly across the full tread width in all six grooves. These tread wear indicators shall be 0.063 in. (1.6 mm) deepand approximately 0.50 in. (12.7 mm) long. A visual wear guideline shall be located on the shoulder of the tire 0.22 in. (5.6 mm)

TABLE 1 Compounding of Oil-Extended Styrene-Butadiene Blend Rubber (SBR) Tread

Compound	Parts by Mass
SBR 1712[A]	89.38
CB1J252[B]	48.12
N347[C]	75.00
Highly aromatic oil	9.00
Zinc oxide	3.00
Stearic acid	2.00
Santoflex 13[D]	2.00
Paraffinic wax	2.00
Santocure NS[E]	1.10
DPG[F]	0.10
Sulfur	1.80

[A]Styrene-butadiene rubber (23.5 % styrene) 37.5 parts of high-aromatic oil.
[B]Cis-polybutadiene with 37.5 parts of high-aromatic oil. (CB441 has been determined to be equivalent).
[C]N347 Carbon Black, see Classification D 1765.
[D] Santoflex 13, dimethyl butylphenyl phenylenediamine.
[E]Santocure NS, butyl benzothiazole sulfenamide.
[F]DPG, diphenyl guanidine.

TABLE 2 Physical Requirements of Tread Compound

Tensile sheet cure, min at 300°F (149°C)	30
300 % modulus, psi (MPa)	800 ± 200 (5.5 ± 1.4)
Tensile sheet durometer	58 ± 2
Restored energy (rebound or resilience)	46 ± 2
Specific gravity	1.13 ± .02
Tensile strength, min, psi (MPa)	2000 (13.8)
Elongation, min, %	500
Tire tread durometer	58 ± 2

from the tread surface as shown in Fig. 2.

7. Workmanship

7.1 Tires shall be free of defects in workmanship and material.

8. Test Methods

8.1 *Tensile Sheet Cure*—Practice D 3182.

8.2 *Modulus* (300 %)—Test Methods D 412.

8.3 *Tensile Sheet Durometer*—Test Method D 2240, using a Type A Shore durometer.

8.4 *Restored Energy (Rebound or Resilience)*—Test Method D 1054.

8.5 *Specific Gravity*— Test Methods D 297.

8.6 *Tensile Strength*— Test Methods D 412.

8.7 *Elongation*—Test Methods D 412.

8.8 *Tire Tread Durometer*—Test Method D 2240, in addition to the following specific procedures:

8.8.1 Use a Type A durometer. (A 0.5-in. (12.7-mm) diameter presser foot, Shore, code XAHAF is recommended.)

8.8.2 The durometer shall be calibrated at a reading of 60 hardness.

8.8.3 Condition the tire and durometer to equilibrium at 73.4 ± 3.6°F (23 ± 2°C) before determining tread hardness.

8.8.4 The tire tread hardness is to be determined by averaging at least one set of six readings. A set is one reading taken in the center of each rib, excluding the center rib. It is recommended that additional sets of readings be taken around the tread circumference.

8.8.5 Apply presser foot to the tire tread as rapidly as possible without shock, keeping the foot parallel to the tread surface. Apply just sufficient pressure to obtain firm contact between presser foot and tire tread surface. Read the durometer scale within 1 s after presser foot is in contact with the tire tread, but after initial maximum transient which may occur immediately after contact is made.

9. Certification

9.1 Tires are to be inflated and measured prior to shipment. Upon request, the manufacturer shall furnish the purchaser certification that the test tire meets this specification.

9.2 All tires under certification shall be subject to the manufacturer's normal variation.

10. Packaging and Preservation

10.1 The tires should be kept dry under ordinary atmospheric conditions in subdued light, 70 ± 25°F (21 ± 13.8°C). Tires should not be stored near electric motors, welders, or other ozone generating equipment.

11. Recommendations for Tire Use and Operational Requirements

11.1 The tire is for skid testing only and is not designed for general highway service. Necessary transport of test equipment should be on commercial tires.

11.2 A new tire break-in of 200 miles (320 km) minimum should be made on tires by the purchaser before using the tire for testing.

11.3 The tire shall be operated with not less than 24 psi (165 kPa) inflation.

11.4 The recommended static test load on the tire shall be 1085 lbf (4826 N), with loading to a maximum of 1380 lbf (6138 N) permissible, at 24 psi (165 kPa) inflation.

11.5 When irregular wear or damage results from tests or when the remaining groove depth in any groove is 0.165 in. (4.2 mm) or less, the use of the tire as a standard test tire shall be discontinued.

11.6 **Caution**—Measured friction force and skid number (SN) may be influenced by tire groove depth, or tread hardness, or both. The magnitude of this dependence is a function of the water depth, pavement characteristics, test speed, and tire aging effects.