Designation: E1136 – 14

Standard Specification for P195/75R14 Radial Standard Reference Test Tire[1]

This standard is issued under the fixed designation E1136; 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 P195/75R14 radial standard reference test tire. The tire covered by this specification is primarily for use as a reference tire for braking traction, snow traction, and wear performance evaluations, but may also be used for other evaluations, such as pavement roughness, noise, or other tests that require a reference tire.

1.1.1 Other standard reference test tires are also used for these purposes and are referenced in Section 2.

1.2 This specification provides a rim code diameter of 14, standard tire design and construction, standard dimensions, and specifies the conditions of storage.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered 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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D1054 Test Method for Rubber Property—Resilience Using a Goodyear-Healey Rebound Pendulum (Withdrawn 2010)[3]

D1765 Classification System for Carbon Blacks Used in Rubber Products

D2240 Test Method for Rubber Property—Durometer Hardness

D3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets

D7121 Test Method for Rubber Property—Resilience Using Schob Type Rebound Pendulum

E867 Terminology Relating to Vehicle-Pavement Systems

F538 Terminology Relating to the Characteristics and Performance of Tires

F2493 Specification for P225/60R16 97S Radial Standard Reference Test Tire

F2870 Specification for 315/70R22.5 154/150L Radial Truck Standard Reference Test Tire

F2871 Specification for 245/70R19.5 136/134M Radial Truck Standard Reference Test Tire

F2872 Specification for 225/75R16C 116/114S M+S Radial Light Truck Standard Reference Test Tire

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this specification, refer to Terminology F538.

3.1.2 *all-season tread, n*—tread design providing dry, wet, and snow traction performance for an optimized balance for year-round performance and which may meet the Rubber Manufacturers Association (RMA) definition for an M&S, M+S, M/S, MS, etc. marked tire (see RMA "Snow Tire Definitions for Passenger and Light Truck (LT) Tires"[4]). **F538**

3.1.3 *pavement characteristic, n*—physical feature or property of a pavement surface such as type, roughness, texture, and skid resistance. **E867**

3.1.4 *pitch, n*—unit of tread pattern elements used in various combinations to obtain optimum noise levels. **F538**

3.1.5 *standard reference test tire, SRTT, n*—tire that is used as a control tire or surface monitoring tire (for example, Specification F2493, F2870, F2871, and F2872 tires). **F538**

[1] This specification is under the jurisdiction of ASTM Committee F09 on Tires and is the direct responsibility of Subcommittee F09.20 on Vehicular Testing.

Current edition approved Aug. 15, 2014. Published September 2014. Originally approved in 1986. Last previous edition approved in 2010 as E1136 – 10. DOI: 10.1520/E1136-14.

[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] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from the Rubber Manufacturers Association 1400 K Street, N.W. Washington, D.C. 20005.

FIG. 1 Front View of the P195/75R14 Radial Standard Reference Test Tire

FIG. 2 Side View of the P195/75R14 Radial Standard Reference Test Tire

4. Design and Construction

4.1 The P195/75R14 standard reference test tire shall feature the steel-belted radial technology and an all-season tread design (see Fig. 1 and Fig. 2), and with technology as described in Sections 5 – 7.

4.2 The tire shall be designed to conform with the Tire and Rim Association, Inc. (TRA) standard nominal dimensions and tolerances for cross section and overall diameter found in the current Year Book.[5]

4.3 The tire used for this specification is produced by Michelin Passenger and Light Truck Tire Manufacturing.[6] The tire stampings on the sidewall include: "ASTM E1136," "Standard Reference Test Tire," and ECE (Economic Commission for Europe) and DOT (Department of Transportation) certification marks.

4.4 Beginning in 2014, the tire is marked with an arrow which provides a rotational orientation for those testers who choose to reference it. (See Fig. 3.)

5. Materials and Manufacture

5.1 The individual standard reference test tires shall conform to the manufacturer's design standards. Dimensions and permissible variations are given in Fig. 4 and Table 1.

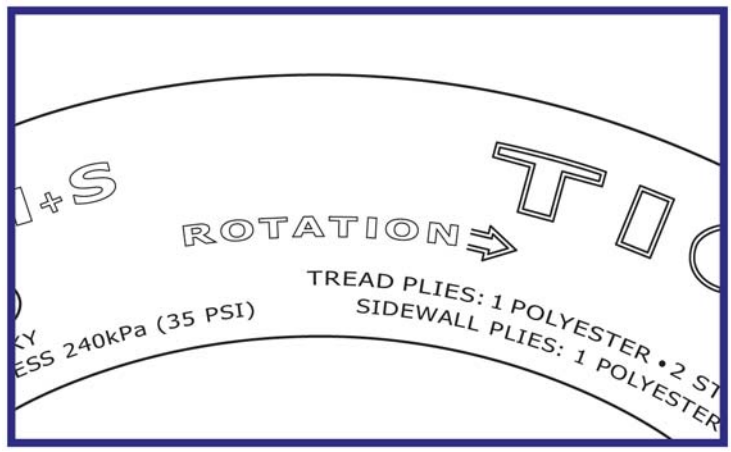

FIG. 3 Example of Rotation Arrow

[5] Available from the Tire and Rim Association, Inc., 175 Montrose West Ave., Suite 150, Copley, OH 44321.

[6] The sole source of supply of the standard reference tire known to the committee at this time is Michelin Passenger and Light Truck Tire Manufacturing, 1101 Michelin Road, Ardmore, OK 73401 (specify P195/75R14 SRTT Uniroyal Tiger Paw). Ordering information is available on the ASTM F09 website: http://www.astm.org/COMMIT/COMMITTEE/F09.htm. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

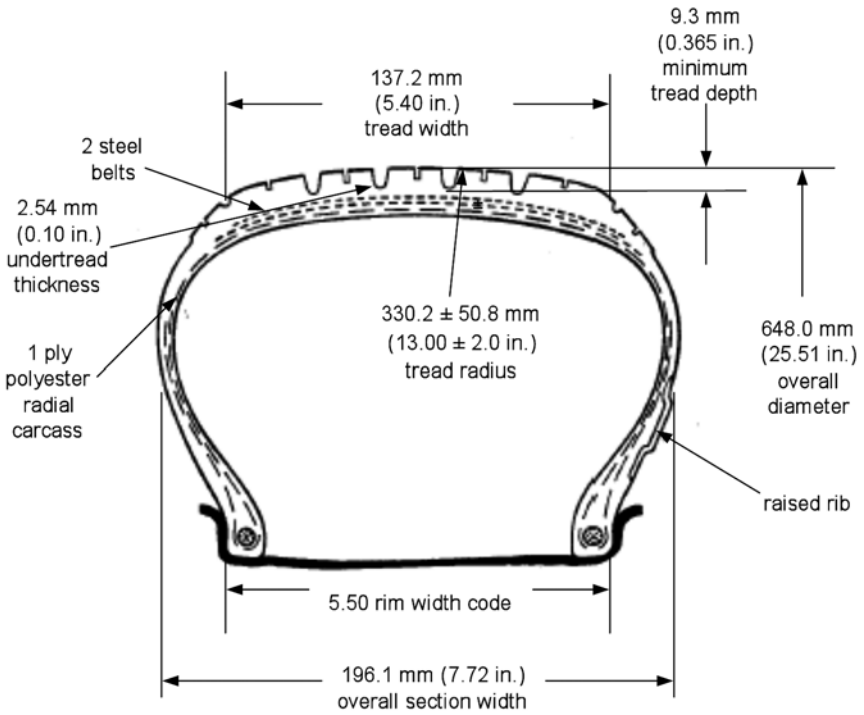

FIG. 4 Tire Cross Section

TABLE 1 Physical Properties of Tread Compound

Tensile sheet cure, min at 160°C (320°F)	15.0 min
Stress at 300 % elongation MPa (psi)	11.4 ± 1.0 (1650 ± 150)
Tensile strength, min, MPa (psi)	15.2 (2200)
Elongation, min %	420 % min
Durometer hardness[A]	65 + 4/−1, Type A
Restored energy (rebound or resilience) % (historical Goodyear-Healey pendulum – D1054)	39 ± 2
Restored energy (rebound or resilience) % - Shob type pendulum – D7121 (under evaluation)	To be established

[A] Measured on tire tread.

TABLE 2 Formulation of Oil-Extended Styrene-Butadiene BR (75/25) Blend Rubber Tread

Compound	Parts by Mass
SBR 1778[A]	12.38
SBR 1502[B]	66.00
CIS 1-Polybutadiene[C]	25.00
N351 black[D]	64.00
Naphthenic oil	17.13
Zinc oxide	5.00
Stearic acid	1.50
6 PPD[E]	1.50
TMQ[F]	2.00
Antidegradant wax	0.50
Tackifying hydrocarbon resin	2.00
TBBS[G]	0.80
DPG[H]	0.25
Sulfur	1.90

[A] Styrene-butadiene rubber (23.5 % Styrene) contains 37.5 parts of naphthenic oil.
[B] Styrene-butadiene rubber (23.5 % Styrene).
[C] CIS Content 95 % min.
[D] N351 carbon black, see Classification D1765.
[E] n-1,3-Dimethylbutyl-N'-phenyl-*p*-phenylenediamine.
[F] Polymerized,1,2-dihydro-2,2,4-trimethylquinoline.
[G] N-t-butyl-2-benzothiazole sulfenamide.
[H] Diphenylquanidine.

5.2 Tread compounding, fabric processing, and all the steps in tire manufacturing shall be controlled to ensure minimum variability between tires.

5.3 The standard reference test tire shall be as originally molded without any tread grinding or repairs.

6. Material Requirements

6.1 The requirements for the tread compound are given in Table 2.

6.1.1 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.

6.2 The tire shall be of the following construction:

6.2.1 One-ply sidewall (polyester),

6.2.2 A three-ply tread (one polyester and two steel belts), and

6.2.3 Black sidewall construction.

7. Physical Properties

7.1 The physical properties of the tread compound are listed in Table 1.

7.2 The historical physical property of rubber resilience for the tread compound as determined by Test Method D1054 is to be replaced by the value established using Test Method D7121.

7.2.1 The historical Goodyear-Healey rebound pendulum rubber resilience value continues to be shown in Table 1.

7.2.1.1 The Goodyear-Healey rebound pendulum equipment and test method has been inactive in most of the ASTM community and testing under Test Method D7121 has been the generally accepted test method.

7.2.2 Long term evaluations of the tread compound by the current manufacturer will validate the Test Method D7121 Shob-tested rubber property resilience value to be shown in Table 1.

7.2.3 Rubber property resilience is performed by the current manufacturer through an established proprietary test method.

8. Dimensions and Permissible Variations

8.1 Details of dimensions are listed as follows and are shown in Fig. 4. When tolerances are not specified, tire dimensions are subject to manufacturer's normal tolerances.

8.2 *Inflated Dimensions and Cured Cord Angles:*

8.2.1 The tread width shall be 137.2 mm (5.40 in.) and the cross-sectional tread radius shall be 330.2 ± 50.8 mm (13.0 ± 2.0 in.).

8.2.2 The tread radius is measured using the three point drop method (see Fig. 5 for an example of how the measurement is taken).

8.2.3 The tire shall have an overall width of 196.1 mm (7.72 in.), and an outside diameter of 648.0 mm (25.51 in.) when mounted on a TRA measuring rim (14 × 5.5 J).

8.2.4 The cured cord angles shall be 90 ± 2° for the carcass and 21.0 ± 2° for the belts.

8.3 *Ribs*—The tire shall have five ribs.

8.4 *Grooves*—The tire shall have four circumferential grooves having a minimum tread depth of 9.3 mm (0.365 in.).

8.5 *Tread Design:*

8.5.1 *Groove (Void) Area Fraction*—34.8 %.

8.5.2 *Number of Pitches*—56.

8.5.3 *Footprint Size*—159 mm (6.26 in.) long by 129 mm (5.08 in.) wide (as measured at 468 kg (1032 lb) load and 240 kPa (35 psi).

8.6 *Tread Wear Indicators*—There shall be wear indicators in each groove, laterally across the tread width in six locations, spaced approximately equally around the tire circumference. The height of the wear indicators in the grooves shall be 1.6 mm (0.063 in.).

NOTE 1—Tread depth is not to be measured at these wear indicators.

FIG. 5 Measuring the Tread Radius Using the Three Point Drop Method

9. Workmanship

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

10. Test Methods

10.1 *Preparation of the Tensile Sheet Cure,* shall be in accordance with Practice D3182.

10.2 *Stress at 300 % Elongation,* shall be in accordance with Test Methods D412.

10.3 *Restored Energy (Rebound or Resilience),* shall be in accordance with Test Method D1054.

10.3.1 *Under Evaluation*—Restored energy (rebound or resilience) in accordance with Test Method D7121.

10.4 *Tensile Strength,* shall be in accordance with Test Methods D412.

10.5 *Elongation,* shall be in accordance with Test Methods D412.

10.6 *Tire Tread Hardness,* shall be in accordance with Test Method D2240 in addition to the following:

10.6.1 Use a Type A durometer that has the center of the presser foot at a minimum of 6.1 mm (0.24 in.) from any edge of the foot.

10.6.2 Check the durometer operations and state of calibration of the durometer with the rubber reference block(s).

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

10.6.4 Determine the tire tread hardness by averaging at least four readings. Take these readings in the center of each rib, excluding the center rib. It is recommended that additional sets of readings be taken around the tread circumference.

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

11. Certification

11.1 The tires are manufactured throughout the year in specific campaign quantities, that is, batches, that are identified by a tread area marking.

11.2 Upon request, the manufacturer shall furnish to the purchaser certification that the tires meet this specification.

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

11.4 For purposes of certification, it is noted that these tires do not contain aromatic oils.

12. Storage and Preservation

12.1 The tires shall be stored under constant relative humidity conditions at a temperature not to exceed 21°C (70°F) and above freezing. The ozone level in the storage area shall not exceed 5 parts/10^8 (or 5 mPa partial pressure), and no tires shall be stored within 9.1 m (30 ft) of electrical motors or other ozone generating equipment. Storage of the tires shall also be in subdued light, with the tires stacked unbundled, no more than eight tires high on a pallet.

13. Recommendations for Tire Use and Operational Requirements

13.1 It is recommended that the tire be used as a reference for performance evaluations (that is, traction, noise, pavement characteristics, and where a standard reference test tire is determined to be required).

13.2 The tire shall be mounted on a 5.50 rim width code (a 14 × 5.5 J wheel is recommended).

13.3 When irregular wear or damage results from tests, or when wear influences the test results, the use of the tire shall be discontinued.

13.4 (**Warning—**Test results such as measured friction force may be influenced by tire tread depth or tread hardness, or both. The magnitude of this dependence is a function of the water depth, pavement characteristics, test speed, tire aging effects, and break-in.)

14. Keywords

14.1 airport runway friction; F09; fixed slip; SRTT; standard reference test tire; tire pavement friction; traction; treadwear