

**TRUCK AND BUS TIRE PERFORMANCE REQUIREMENTS
AND TEST PROCEDURES—SAE J341a****SAE Recommended Practice**

Report of Tire Committee approved June 1968 and last revised February 1973.

1. Scope—This SAE Recommended Practice provides tire dimensions and uniform laboratory test procedures for evaluating certain essential characteristics of new pneumatic tires intended primarily for highway use on trucks, buses, trailers, and multipurpose passenger vehicles.

(The requirements and test procedures published in this SAE Recommended Practice pertain to tire sizes currently used in the United States on trucks, buses, trailers, and multipurpose passenger vehicles. For related information on tire sizes not listed, contact Society of Automotive Engineers, Inc., Detroit Branch Office, 18121 East Eight Mile Road, East Detroit, Michigan 48021.)

2. Definitions

2.1 Bead—That part of the tire made of steel wires, wrapped or reinforced by ply cords, that is shaped to fit the rim.

2.2 Bead Separation—A breakdown of bond between components in the bead area.

2.3 Bias Ply Tire—A pneumatic tire in which the ply cords that extend to the beads are laid at alternate angles substantially less than 90 deg to the centerline of the tread.

2.4 Broken Cord—Cords showing a discontinuity or interruption along the major axis of the cords which can be determined by visual inspection.

2.5 Carcass—Tire structure, except tread and sidewall rubber.

2.6 Chunking—The breaking away of pieces of the tread from the tire carcass.

2.7 Cords—The strands forming the plies in the tire.

2.8 Cord Separation—Cords parting from adjacent rubber compounds.

2.9 Cracking Failure—Any parting of the tread, sidewall, or innerliner rubber, within itself extending to the tire cord.

2.10 Groove—Space between two adjacent tread ribs, cleats, or lugs. This does not include sipes or cuts.

2.11 Innerliner—A layer of rubber covering the inside of the carcass of a tubeless tire used for purposes of maintaining inflation pressure.

2.12 Innerliner Separation Failure—Pulling away of the innerliner from the tire carcass, resulting in air loss.

2.13 Load Range—Expressed as a letter (A, B, C, D, E, F, G, etc.) in tire size identification and used to identify a given size tire with its load and inflation limits when used in a specific type of service (for example, dual application in highway service).

2.14 Load Rating—The maximum load a tire is rated to carry for a given usage at a specified inflation pressure.

2.15 Maximum Load Rating—The highest load recommended for a tire in a specific type of highway service.

2.16 Measuring Rim—A rim of specific width as specified by the Tire and Rim Association, Inc. (TRA) on which basic tire dimensions are determined.

2.17 Mining and Logging Tires—Tires made for use both on and off highways, identified by letters "ML" as suffix in the tire size identification. These tires are restricted to a maximum speed of 50 mph and intermittent highway service which means that the distance traveled in any 1½ h period must not exceed 50 miles (80 km).

2.18 Normal Highway Service—Service over highways, roads, and streets without special speed limitations.

2.19 Open Splices—A parting of the tread, sidewall, or innerliner junction which exposes the tire cord.

2.20 Overall Tire Width—The width of a new tire, including 24 h inflation growth and including protective side ribs, bars, and decorations.

2.21 Ply—A layer of rubber coated parallel cords.

2.22 Ply Separation—A parting of rubber compound between adjacent plies.

2.23 Pneumatic Tire—A mechanical device made of rubber, chemicals, fabric, steel, or other materials which, when mounted on an automotive wheel, provide traction and contains the gas or fluid that sustains the load.

2.24 Radial Ply Tire—A pneumatic tire in which the ply cords that extend to the beads are laid at substantially 90 deg to the centerline of the tread.

2.25 Rim—A metal support for a tire or a tire and tube assembly upon which the tire beads are seated.

2.26 Sidewall—That area of a tire between the outer edges of the tread and the bead area.

2.27 Size Factor—The size factor of a tire is the sum of its section width on its measuring rim and its overall diameter.

2.28 Special Bus Tires

2.28.1 INTERCITY—For use on buses operating in intercity service at speeds within recognized speed limits.

2.28.2 CITY-SUBURBAN—For use on buses operating only in city and suburban service with speeds limited to 55 mph (88 km/h) (maximum) for continuous operation not to exceed 1 h. Identified as "city-suburban—max speed: 55 mph (88 km/h)".

2.28.3 CITY—For use on buses operating only in slow speed stop-start intracity service, maximum speed not to exceed 35 mph (56 km/h). Identified as "city—max speed: 35 mph (56 km/h)".

2.29 Test Rim—Any rim approved in the current TRA Yearbook for use with a particular tire size.

TABLE 1—MINIMUM PLUNGER ENERGY VALUES (BIAS AND RADIAL CONSTRUCTION)^a
(Minimum Static Breaking Energy Values for Truck, Trailer, Bus, and Multipurpose Passenger Vehicle Tires)

Load Range	3/4 in (19 mm) Diameter						1-1/4 in (32 mm) Diameter				1-1/2 in (38 mm) Diameter			
	Conventional Tire		Wide-Base and Flotation Tires		Mobile Home Tires		Conventional Tire		Wide-Base Tire		Conventional Tire		Wide-Base Tire	
	in-lb	J	in-lb	J	in-lb	J	in-lb	J	in-lb	J	in-lb	J	in-lb	J
A	—	—	2000	226	—	—	—	—	—	—	—	—	—	—
B	2600	294	2600	294	—	—	—	—	—	—	—	—	—	—
C	3200	362	3200	362	—	—	6,800	768	5,100	576	—	—	—	—
D	4550	514	4550	514	2400	271	7,900	893	6,500	734	—	—	—	—
E	5100	576	5100	576	3000	339	12,500	1412	8,600	972	—	—	—	—
F	5700	644	5700	644	3600	406	15,800	1785	12,500	1412	—	—	—	—
G	6300	712	6300	712	—	—	—	—	—	—	20,200	2282	15,000	1695
H	—	—	6800	768	—	—	—	—	—	—	23,000	2599	18,500	2090
J	—	—	—	—	—	—	—	—	—	—	25,000	2824	19,500	2203
L	—	—	—	—	—	—	—	—	—	—	27,000	3055	—	—
M	—	—	—	—	—	—	—	—	—	—	28,000	3220	—	—
N	—	—	—	—	—	—	—	—	—	—	30,000	3389	—	—

^a Rayon cord tires to be 60% of the value shown.

2.30 Tire Section Width—The width of a new tire, including 24 h inflation growth and including normal side walls, but not including protective side ribs, bars, or decoration.

2.31 Tread—That portion of a tire that comes into contact with the road.

2.32 Tread Elements—Those raised segments of the tread pattern extending circumferentially around a tire.

2.33 Tread Separation—Parting of the tread from the tire carcass.

3. Requirements

3.1 General—Tires shall meet the requirements specified in paragraph 3.2.

3.2 Performance Requirements

3.2.1 TEST SAMPLE—For each test sample, two new tires are required as follows:

3.2.1.1 The first tire shall be used for physical dimensions and plunger energy tests.

3.2.1.2 The second tire shall be used for an endurance test.

3.2.2 PHYSICAL DIMENSIONS—Using the procedure described in paragraph 4.1, tires shall meet the requirements of the minimum size factor dimensions, maximum overall new tire widths, and maximum overall new tire diameters as indicated in the current TRA Yearbook.

3.2.3 TIRE STRENGTH—Tires shall meet or exceed the requirements for plunger energy specified in Table 1 when tested in accordance with paragraph 4.2, except that if the plunger bottoms on the rim without breaking the tire in all plunger applications, the tire shall be considered as having passed the requirements of this test.

3.2.4 TIRE ENDURANCE—When tested in accordance with the laboratory wheel endurance test specified in paragraph 4.3, tires shall have no tread, sidewall, ply, cord, or bead separation; or chunking, broken cords, cracking failure, innerliner separation failure, or open splices.

TABLE 2—STRENGTH TEST SCHEDULE—PLUNGER DIAMETERS
(Bias and Radial Construction)

1972 TRA Yearbook Tables	Categories	Plunger Diameter	
		in	mm
LT-1B, LT-1R, TLT-1B, TLT-1R, WBLT-1B WBLT-1R, T-1B, T-1R, MH-1 SDWB-3	All	3/4	19
TB-1B, TB-1R, TTB-1B TTB-1R, WBTB-1B, WBTB-1R SDTB-1B, SDTB-1R HL-1B, SDB-1B TB-3ML, SSD-TB-3ML	Load range F and below	1-1/4	32
	Load range G and above	1-1/2	38

4. Test Procedures

4.1 Physical Dimensions—Determine the tire physical dimensions under uniform ambient conditions as follows:

4.1.1 Mount the tire on the appropriate measuring rim and inflate to the pressure designated in the current TRA Yearbook, corresponding to the maximum load (or maximum dual load where both single and dual loads are shown).

4.1.2 Condition the tire in a uniform ambient temperature within a range of $75 \pm 15^\circ\text{F}$ ($24 \pm 8^\circ\text{C}$) for at least 24 h.

4.1.3 Readjust to pressure specified in paragraph 4.1.1.

4.1.4 Caliper the overall tire width at six points approximately equally spaced around the tire circumference. Determine the tire section width by subtracting included elevations due to labeling, decoration, or protective bands. Overall tire width may also be determined by measuring the tire section width and adding elevations due to labeling, decorations, or protective bands.

4.1.5 Record the average of these measurements as the overall tire width and tire section width, respectively.

4.1.6 Determine the tire overall diameter by measuring the maximum circumference of the tire and dividing this dimension by π (3.1416).

4.1.7 Calculate the size factor by adding the average section width to the overall diameter.

4.2 Strength

4.2.1 PREPARATION OF TIRE

4.2.1.1 After the physical dimension check, mount the tire on the test rim and inflate to the pressure specified in the current TRA Yearbook. Use the pressure corresponding to the maximum load (or maximum dual load where both single and dual loads are shown). A tube may be used in a tubeless tire for testing convenience. Tread surface must be clean and dry.

4.2.1.2 Condition the mounted tire at a laboratory ambient temperature of $75 \pm 15^\circ\text{F}$ ($24 \pm 8^\circ\text{C}$) for at least 3 h.

4.2.1.3 Readjust the pressure to that specified in paragraph 4.2.1.1.

4.2.2 TEST PROCEDURE

4.2.2.1 Force a cylindrical steel plunger with a hemispheric end into a tread element perpendicular to the tire axis and as near the tread centerline as possible at a rate of 2 in/min (0.85 mm/s). Avoid plunger penetration into the tread grooves. Use an appropriate steel plunger of the diameter specified in Table 2.

4.2.2.2 Record the plunger force and the distance of penetration at break at five test points equally spaced around the tire circumference. If the tire fails to break before the plunger is stopped by reaching the rim, record the force and penetration as the rim is reached for the values to be used in paragraph 4.2.2.3.

4.2.2.3 Compute the tire plunger energy for each test point with

TABLE 3—ENDURANCE SCHEDULE

Description	Test Wheel Speed, rpm	Test Load, ^a %	h	Total Test Wheel Revolutions (thousands)	Description	Test Wheel Speed, rpm	Test Load, ^a %	h	Total Test Wheel Revolutions (thousands)
Normal highway service tires and mobile home tires					Mining and logging tires and 13.00 and 14.00 restricted speed tires				
Load range D and lower	250	75 97 114	7 16 24	705.0	Load range D and lower	150	75 97 114	7 16 24	423.0
Load range E	200	70 88 106	7 16 24	564.0	Load range E and higher	100	66 84 101	7 16 24	282.0
Load range F	200	66 84 101	7 16 24	564.0	Special bus tires				
Load range G	175	66 84 101	7 16 24	493.5	City-suburban service Load range E, F, G	125	66 84 101	7 16 24	352.5
Load range H and higher	150	66 84 101	7 16 24	423.0	City (only) service Load range, E, F, G	75	66 84 101	7 16 24	211.5
					Intercity bus tire test				

^a Test load shall be the indicated percentage of maximum load rating at the corresponding inflation shown in maximum speed table in current TRA Yearbook. When single and dual ratings are specified, use values from single rating table. Test loads are for 67.23 in (1.708 m) diameter

wheel. These test load percentages have been adjusted to 88% of load on flat surface to give equivalent deflections.