inch) of shoe or pad mounting surface on bonded linings or (3) the limit recommended by the manufacturer, whichever is larger relative to the total possible shoe or pad movement. Drums or rotors are assumed to be at nominal design drum diameter or rotor thickness. Linings are assumed adjusted for normal operating clearance in the released position.

(d) The brake system indicators, for compliance with operation in various key positions, lens color, labeling, and location, in accordance with S5.5.

[60 FR 6434, Feb. 2, 1995; as amended at 60 FR 37847, July 24, 1995; 60 FR 44548, Aug. 28, 1995; 62 FR 46917, Sept. 5, 1997; 62 FR 51070, Sept. 30, 1997; 65 FR 6332, Feb. 9, 2000]

§ 571.138 Standard No. 138; Tire pressure monitoring systems.

S1. *Purpose and scope.* This standard specifies performance requirements for tire pressure monitoring systems to prevent significant under-inflation of tires and the resulting safety problems.

S2. *Application.* This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses that have a gross vehicle weight rating of 4,536 kilograms (10,000 pounds) or less, except those vehicles with dual wheels on an axle, according to the phase-in schedule specified in S7 of this standard.

S3. *Definitions.* The following definitions apply to this standard:

Lightly loaded vehicle weight means unloaded vehicle weight plus the weight of a mass of 180 kg (396 pounds), including test driver and instrumentation.

Tire pressure monitoring system means a system that detects when one or more of a vehicle's tires are under-inflated and illuminates a low tire pressure warning telltale.

S4. *Requirements.*

S4.1 *General.* To the extent provided in S7.1 through S7.3, each vehicle must be equipped with a tire pressure monitoring system that meets the requirements specified in S4 under the test procedures specified in S6 of this standard. Prior to November 1, 2006, each tire pressure monitoring system must conform, at the manufacturer's option, to either S4.2.1 or S4.2.2 of this standard. The manufacturer must select the option by the time it certifies the vehicle and may not thereafter select a different option for the vehicle.

S4.2 *Tire pressure monitoring systems: vehicles manufactured after October 31, 2003 and before November 1, 2006.*

S4.2.1 *Option 1: Four tires; 25 percent under-inflation.* The tire pressure monitoring system must:

(a) Illuminate a low tire pressure warning telltale not more than 10 minutes after the inflation pressure in one or more of the vehicle's tires, up to a total of four tires, is equal to or less than either the pressure 25 percent below the vehicle manufacturer's recommended cold inflation pressure, or the pressure specified in the 3rd column of Table 1 of this standard for the corresponding type of tire, whichever is higher; and

(b) Continue to illuminate the low tire pressure warning telltale as long as the pressure in any of the vehicle's tires is equal to or less than the pressure specified in (a), and the key locking system is in the ''On'' (''Run'') position, whether or not the engine is running, or until manually reset in accordance with the vehicle manufacturer's instructions.

S4.2.2 *Option 2: One tire; 30 percent under-inflation.* The tire pressure monitoring system must:

(a) Illuminate a low tire pressure warning telltale not more than 10 minutes after the inflation pressure in one of the vehicle's tires is equal to or less than either the pressure 30 percent below the vehicle manufacturer's recommended cold inflation pressure, or the pressure specified in the 3rd column of Table 1 of this standard for the corresponding type of tire, whichever is higher; and

(b) Continue to illuminate the low tire pressure warning telltale as long as the pressure in that tire is equal to or less than the pressure specified in (a), and the key locking system is in the ''On'' (''Run'') position, whether or not the engine is running, or until manually reset in accordance with the vehicle manufacturer's instructions.

S4.3 *Low tire pressure warning telltale.*

S4.3.1 Each tire pressure monitoring system must include a low tire pressure warning telltale that:

(a) Is mounted inside the occupant compartment in front of and in clear view of the driver;

(b) Is identified by one of the symbols shown for the ''Low Tire Pressure Telltale'' in Table 2 of Standard No. 101 (§571.101); and

(c) Is illuminated under the conditions specified in S4.2.1 or S4.2.2.

S4.3.2 In the case of a telltale that identifies which tire(s) is (are) under-inflated, each tire in the symbol for that telltale must illuminate when the tire it represents is under-inflated to the extent specified in either S4.2.1 or S4.2.2.

S4.3.3 (a) Except as provided in paragraph (b) of this section, each low tire pressure warning telltale must be activated as a check of lamp function either when the key locking system is turned to the ''On'' (''Run'') position when the engine is not running, or when the key locking system is in a position between ''On'' (''Run'') and ''Start'' that is designated by the manufacturer as a check position.

(b) The low tire pressure warning telltale need not be activated when a starter interlock is in operation.

S4.4 *Replacement tires.* Each tire pressure monitoring system must continue to meet the requirements of this standard when the vehicle's original tires are replaced with tires of any optional or replacement size(s) recommended for the vehicle by the vehicle manufacturer.

S4.5 *Written instructions.*

S4.5.1 *Vehicles certified to Option 1: Four tires; 25 percent under-inflation.* The owner's manual in each vehicle certified as complying with S4.2.1 must provide an image of the Low Tire Pressure Telltale symbol with the following statement, in English: ''When the tire pressure monitoring system warning light is lit, one or more of your tires is significantly under-inflated. You should stop and check your tires as soon as possible, and inflate them to the proper pressure as indicated on the vehicle's tire information placard. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability. Each tire, including the spare, should be checked monthly when cold and set to the recommended inflation pressure as specified in the vehicle placard and owner's manual.'' Each vehicle manufacturer may, at its discretion, provide additional information about the significance of the low tire pressure warning telltale illuminating, description of corrective action to be undertaken, whether the tire pressure monitoring system functions with the vehicle's spare tire, and how to use the reset button, if one is provided.

S4.5.2 *Vehicles manufactured after October 31, 2003 and before November 1, 2006, and certified to Option 2: One tire; 30 percent under-inflation.* The owner's manual in each vehicle certified as complying with S4.2.2 must comply with S4.5.1 and provide the following statement, in English:

''NOTE: The tire pressure monitoring system on your vehicle will warn you when one of your tires is significantly under-inflated and when some combinations of your tires are significantly under-inflated. However, there are other combinations of significantly under-inflated tires for which your tire pressure monitoring system may *not* warn you. These other combinations are relatively common, accounting for approximately half the instances in which vehicles have significantly under-inflated tires. For example, your system may not warn you when both tires on the same side or on the same axle of your vehicle are significantly under-inflated. It is particularly important, therefore, for you to check the tire pressure in all of your tires regularly and maintain proper pressure.''

S5. *Test conditions.*

S5.1 *Ambient temperature.* The ambient temperature is between 0 °C (32 °F) and 40 °C (104 °F).

S5.2 *Road test surface.* Road tests are conducted on a dry, smooth roadway.

S5.3 *Vehicle conditions.*

S5.3.1 *Test weight.* The vehicle is tested at its lightly loaded vehicle weight and at its gross vehicle weight rating without exceeding any of its gross axle weight ratings.

S5.3.2 *Vehicle speed.* The vehicle is tested at a speed between 50 km/h (31.1 mph) and 100 km/h (62.2 mph).

S6. *Test procedures.*

(a) Inflate the vehicle's tires to the vehicle manufacturer's recommended cold inflation pressure for the applicable vehicle load conditions specified in

paragraph S5.3.1 of this standard. If the vehicle manufacturer has not recommended an inflation pressure for the lightly loaded condition, the inflation pressure specified by the vehicle manufacturer for the gross vehicle weight rating is used.

(b) With the vehicle stationary and the key locking system in the ''Lock'' or ''Off'' position, turn the key locking system to the ''On'' or ''Run'' position. The tire pressure monitoring system must perform a check of telltale lamp function as specified in paragraph S4.3.3 of this standard.

(c) If applicable, reset the tire pressure monitoring system in accordance with the instructions specified in the vehicle owner's manual.

(d) Drive the vehicle at any speed specified in paragraph S5.3.2 of this standard for 20 minutes.

(e)(1) For vehicles complying with S4.2.1, stop the vehicle and deflate any combination of one to four tires until the deflated tire(s) is (are) at 7 kPa (1 psi) below the inflation pressure at which the low tire pressure monitoring system is required to activate the low tire pressure warning telltale for that vehicle.

(2) For vehicles complying with S4.2.2, stop the vehicle and deflate any one tire until the deflated tire is at 7 kPa (1 psi) below the inflation pressure at which the low tire pressure monitoring system is required to activate the low tire pressure warning telltale for that vehicle.

(f) Drive the vehicle at any speed specified in paragraph S5.3.2 of this standard. Record the time from when the vehicle speed reaches 50 km/h until the time the low tire pressure warning telltale illuminates. The telltale must illuminate within 10 minutes as required in paragraph S4.2.1(a) or S4.2.2(a) of this standard.

(g) Stop the vehicle and turn the key locking system to the ''Off'' or ''Lock'' position. After a 5 minute period, turn the vehicle's key locking system to the ''On'' or ''Run'' position. The telltale must remain illuminated.

(h) Keep the vehicle stationary for a period of one hour.

(i) Inflate all of the vehicle's tires to the vehicle manufacturer's recommended cold inflation pressure. If the vehicle's tire pressure monitoring system has a manual reset feature, reset the system in accordance with the instructions specified in the vehicle owner's manual.

(j) Drive the vehicle at any speed specified in paragraph S5.3.2 of this standard. The telltale must extinguish as specified in paragraph S4.2.1(b) or S4.2.2(b).

(k)(1) For vehicles complying with S4.2.1, if additional combinations of tires are tested, repeat the test procedures in paragraphs S6(a) through (j).

(2) For vehicles complying with S4.2.2, if the other individual tires are tested, repeat the test procedures in paragraphs S6(a) through (j).

(l) Utilizing the existing vehicle rims, repeat the test procedures in paragraphs S6(a) through (k) for each tire size recommended for the vehicle by the vehicle manufacturer. Note: If a different rim size is required, OEM rim and tire assemblies appropriate for the tire pressure monitoring system are used for testing.

S7. *Phase-In Schedule.*

S7.1 *Vehicles manufactured on or after November 1, 2003, and before November 1, 2004.* For vehicles manufactured on or after November 1, 2003, and before November 1, 2004, the number of vehicles complying with this standard must not be less than 10 percent of:

(a) The manufacturer's average annual production of vehicles manufactured on or after November 1, 2000, and before November 1, 2003; or

(b) The manufacturer's production on or after November 1, 2003, and before November 1, 2004.

S7.2 *Vehicles manufactured on or after November 1, 2004, and before November 1, 2005.* For vehicles manufactured on or after November 1, 2004, and before November 1, 2005, the number of vehicles complying with this standard must not be less than 35 percent of:

(a) The manufacturer's average annual production of vehicles manufactured on or after November 1, 2001, and before November 1, 2004; or

(b) The manufacturer's production on or after November 1, 2004, and before November 1, 2005.

S7.3 *Vehicles manufactured on or after November 1, 2005, and before November 1, 2006.* For vehicles manufactured on or

after November 1, 2005, and before November 1, 2006, the number of vehicles complying with this standard must not be less than 65 percent of:

(a) The manufacturer's average annual production of vehicles manufactured on or after November 1, 2002, and before November 1, 2005; or

(b) The manufacturer's production on or after November 1, 2005, and before November 1, 2006.

S7.4 *Calculation of complying vehicles.*

(a) For purposes of complying with S7.1, a manufacturer may count a vehicle if it:

(1) Is manufactured on or after November 1, 2003, but before November 1, 2004; or

(2) Complies with S4.2.1 or S4.2.2 of this standard.

(b) For purposes of complying with S7.2, a manufacturer may count a vehicle if it:

(1)(i) Is manufactured on or after November 1, 2003, but before November 1, 2005;

(ii) Is not counted toward compliance with S7.1; and

(iii) Complies with S4.2.1 of this standard, or

(2)(i) Is manufactured on or after November 1, 2004, but before November 1, 2005; and

(ii) Complies with S4.2.2 of this standard.

(c) For purposes of complying with S7.3, a manufacturer may count a vehicle if it:

(1)(i) Is manufactured on or after November 1, 2003, but before November 1, 2006;

(ii) Is not counted toward compliance with S7.1 or S7.2; and

(iii) Complies with S4.2.1 of this standard, or

(2)(i) Is manufactured on or after November 1, 2005, but before November 1, 2006; and

(ii) Complies with S4.2.2 of this standard.

S7.5 *Vehicles produced by more than one manufacturer.*

S7.5.1 For the purpose of calculating average annual production of vehicles for each manufacturer and the number of vehicles manufactured by each manufacturer under S7.1 through S7.3, a vehicle produced by more than one manufacturer must be attributed to a single manufacturer as follows, subject to 7.5.2:

(a) A vehicle that is imported must be attributed to the importer.

(b) A vehicle manufactured in the United States by more than one manufacturer, one of which also markets the vehicle, must be attributed to the manufacturer that markets the vehicle.

S7.5.2 A vehicle produced by more than one manufacturer must be attributed to any one of the vehicle's manufacturers specified by an express written contract, reported to the National Highway Traffic Safety Administration under 49 CFR Part 590, between the manufacturer so specified and the manufacturer to which the vehicle would otherwise be attributed under S7.5.1.

S7.6 *Small volume manufacturers.* Vehicles manufactured during any of the three years of the November 1, 2003 to October 31, 2006 phase-in by a manufacturer that produces fewer than 5,000 vehicles worldwide during that year are not required to comply with the standard.

S7.7 *Final-stage manufacturers and alterers.*

Vehicles that are manufactured in two or more stages or that are altered (within the meaning of 49 CFR §567.7) after having previously been certified in accordance with Part 567 of this chapter are not subject to the requirements of S7.1 through S7.5.

Tables to §571.138

TABLE 1—LOW TIRE PRESSURE WARNING TELLTALE—MINIMUM ACTIVATION PRESSURE

Tire type	Maximum or rated inflation pressure		Minimum activation pressure	
	(kPa)	(psi)	(kPa)	(psi)
P-metric—Standard Load	240, 300, or 350	35, 44, or 51	140	20
P-metric—Extra Load	280 or 340	41 or 49	160	23
Load Range C	350	51	200	29
Load Range D	450	65	260	38
Load Range E	550	80	320	46

[67 FR 38746, June 5, 2002, as amended at 68 FR 4110, Jan. 28, 2003]

§ 571.139 Standard No. 139; New pneumatic tires for light vehicles.

S1. *Scope and purpose.* This standard specifies tire dimensions, test requirements, labeling requirements, and defines tire load ratings.

S2. *Application.* This standard applies to new pneumatic tires for use on motor vehicles (other than motorcycles and low speed vehicles) that have a gross vehicle weight rating (GVWR) of 10,000 pounds or less and that were manufactured after 1975.

S3. *Definitions.*

Intended outboard sidewall means:

(1) The sidewall that contains a whitewall, bears white lettering or bears manufacturer, brand, and/or model name molding that is higher or deeper than the same molding on the other sidewall of the tire, or

(2) The outward facing sidewall of an asymmetrical tire that has a particular side that must always face outward when mounted on a vehicle.

S4. *Tire and rim matching information.*

S4.1. Each manufacturer of tires must ensure that a listing of the rims that may be used with each tire that it produces is provided to the public in accordance with S4.1.1 and S4.1.2.

S4.1.1 Each rim listing for a tire must include dimensional specifications and a diagram of the rim and must be in one of the following forms:

(a) Listed by manufacturer name or brand name in a document furnished to dealers of the manufacturer's tires, to any person upon request, and in duplicate to: Docket Section, National Highway Traffic Safety Administration, 400 Seventh Street, SW., Washington, DC 20590; or

(b) Contained in publications, current at the date of manufacture of the tire or any later date, of at least one of the following organizations:

(1) The Tire and Rim Association.

(2) The European Tyre and Rim Technical Organization.

(3) Japan Automobile Tire Manufacturers' Association, Inc.

(4) Tyre & Rim Association of Australia.

(5) Associacao Latino Americana de Pneus e Aros (Brazil).

(6) South African Bureau of Standards.

S4.1.2 A listing compiled in accordance with paragraph (a) of S4.1.1 need not include dimensional specifications or a diagram of a rim whose dimensional specifications and diagram are contained in a listing published in accordance with paragraph (b) of S4.1.1.

S4.2. Information contained in a publication specified in S4.1.1(b) that lists general categories of tires and rims by size designation, type of construction, and/or intended use, is considered to be manufacturer's information required by S4.1 for the listed tires, unless the publication itself or specific information provided according to S4.1(a) indicates otherwise.

S5. *General requirements.* [Reserved]

S5.5 *Tire Markings.* Except as specified in paragraphs (a) through (h) of S5.5, each tire must be marked on each sidewall with the information specified in S5.5 (a) through (d) and on one sidewall with the information specified in S5.5 (e) through (h) according to the phase-in schedule specified in S7 of this standard. The markings must be placed between the maximum section width and the bead on at least one sidewall, unless the maximum section width of the tire is located in an area that is not more than one-fourth of the distance from the bead to the shoulder of the tire. If the maximum section width falls within that area, those markings must appear between the bead and a point one-half the distance from the bead to the shoulder of the tire, on at least one sidewall. The markings must be in letters and numerals not less than 0.078 inches high and raised above or sunk below the tire surface not less than 0.015 inch. The tire identification and DOT symbol labeling must comply with part 574 of this chapter.

(a) The symbol DOT, which constitutes a certification that the tire conforms to applicable Federal motor vehicle safety standards;

(b) The tire size designation as listed in the documents and publications specified in S4.1.1;

(c) The maximum permissible inflation pressure, subject to the limitations of S5.5.4 through S5.5.6;

(d) The maximum load rating;