

§571.138

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(1) rivet or bolt heads on riveted or bolted linings or (2) within 0.8 mm (1/32 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-in-

flation 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.

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

§ 571.201

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[67 FR 38746, June 5, 2002]

§ 571.201 Standard No. 201; Occupant protection in interior impact.

S1. *Purpose and scope.* This standard specifies requirements to afford impact protection for occupants.

S2. *Application.* This standard applies to passenger cars and to multipurpose passenger vehicles, trucks, and buses with a GVWR of 4,536 kilograms or less, except that the requirements of S6 do not apply to buses with a GVWR of more than 3,860 kilograms.

S3. Definitions.

A-pillar means any pillar that is entirely forward of a transverse vertical plane passing through the seating reference point of the driver's seat.

Ambulance means a motor vehicle designed exclusively for the purpose of emergency medical care, as evidenced by the presence of a passenger compartment to accommodate emergency medical personnel, one or more patients on litters or cots, and equipment and supplies for emergency care at a location or during transport.

B-pillar means the forwardmost pillar on each side of the vehicle that is, in whole or part, rearward of a transverse vertical plane passing through the seating reference point of the driver's seat, unless there is only one pillar rearward of that plane and it is also a rearmost pillar.

Brace means a fixed diagonal structural member in an open body vehicle that is used to brace the roll-bar and that connects the roll-bar to the main body of the vehicle structure.

Convertible means a vehicle whose A-pillars are not joined with the B-pillars (or rearmost pillars) by a fixed, rigid structural member.

Convertible roof frame means the frame of a convertible roof.

Convertible roof linkage mechanism means any anchorage, fastener, or device necessary to deploy a convertible roof frame.

Daylight opening means, for openings on the side of the vehicle, other than a door opening, the locus of all points where a horizontal line, perpendicular to the vehicle longitudinal centerline, is tangent to the periphery of the opening. For openings on the front and rear of the vehicle, other than a door open-

ing, *daylight opening* means the locus of all points where a horizontal line, parallel to the vehicle longitudinal centerline, is tangent to the periphery of the opening. If the horizontal line is tangent to the periphery at more than one point at any location, the most inboard point is used to determine the daylight opening.

Door opening means, for door openings on the side of the vehicle, the locus of all points where a horizontal line, perpendicular to the vehicle longitudinal centerline, is tangent to the periphery of the side door opening. For door openings on the back end of the vehicle, *door opening* means the locus of all points where a horizontal line, parallel to the vehicle longitudinal centerline, is tangent to the periphery of the back door opening. If the horizontal line is tangent to the periphery at more than one point at any location, the most inboard point is the door opening.

Dynamically deployed upper interior head protection system means a protective device or devices which are integrated into a vehicle and which, when activated by an impact, provide, through means requiring no action from occupants, protection against head impacts with upper interior structures and components of the vehicle in crashes.

Forehead impact zone means the part of the free motion headform surface area that is determined in accordance with the procedure set forth in S8.10.

Free motion headform means a test device which conforms to the specifications of part 572, subpart L of this chapter.

Mid-sagittal plane of a dummy means a longitudinal vertical plane passing through the seating reference point of a designated seating position.

Motor Home means a motor vehicle with motive power that is designed to provide temporary residential accommodations, as evidenced by the presence of at least four of the following facilities: Cooking; refrigeration or ice box; self-contained toilet; heating and/or air conditioning; a potable water supply system including a faucet and a sink; and a separate 110–125 volt electrical power supply and/or an LP gas supply.