

NASS-CDS data for 1995 through 1998<sup>11</sup> indicate that there are an estimated 23,464 tow-away crashes per year coded by the NASS investigators (relying on the police report of the crash) as having been caused by blowouts or flat tires. Based on that estimate, about one-half of one percent of all crashes are caused by these tire problems. The rate of blowout-caused crashes for light trucks (0.99 percent) is more than three times the rate of those crashes for passenger cars (0.31 percent). Blowouts cause a much higher proportion of rollover crashes (4.81) than non-rollover crashes (0.28), and more than three times the rate in light trucks (6.88 percent) than in passenger cars (1.87 percent).

FARS data for 1999 through 2001 show that 1.10 percent of all light vehicles in fatal crashes were coded by investigators as having had tire problems. Light trucks had slightly higher rates of tire problems (1.34 percent) than passenger cars (0.92 percent). The annual average number of vehicles with tire problems in FARS was 528 (255 passenger cars and 273 light trucks).

A further examination of the FARS data indicates that heat is a factor in tire problems. An examination of two surrogates for heat, the region of the U.S. in which the crash occurred, and the season in which the crash occurred, indicates that the highest rates of tire problems occurred in light trucks in southern states in the summertime, followed by light trucks in northern states in the summertime, and then by passenger cars in southern states in the summertime. The lowest rates occurred in winter and fall. Based on these data, tires on light trucks appear to be more affected by higher ambient temperatures than tires on passenger cars.

Examining tire problems in the NASS-CDS from 1992 to 1999 by types of light trucks and vehicle size indicates that LT tires used on light trucks exhibited more problems than P-metric tires. LT tires are used on vehicle classes identified for this analysis as Van Large B and Pickup Large B groups of vehicles. These groups of vehicles typically consist of the ¾-ton and 1-ton vans and pick-ups. P-metric tires are

used on most of the other light trucks. The data indicate that the average percentage of light trucks in the NASS-CDS having a LT tire problem is 0.84, while the average percent of light trucks having a P-metric tire problem is 0.47 percent. These larger pickups and vans, however, carry heavier loads and may be more frequently overloaded than lighter trucks. In addition, these heavier vehicles are often used at construction sites and may be more apt to encounter nail punctures and experience flat tires. Thus, there may be usage issues that increase the percentage of tire problems for these larger trucks, rather than exclusively a qualitative difference between P-metric and LT tires.

#### *C. Existing NHTSA Performance Requirements for Tires*

The following discussion summarizes existing NHTSA requirements relating to tires.

FMVSS No. 109, *New pneumatic tires*, 49 CFR 571.109, specifies the requirements for all tires manufactured for use on passenger cars manufactured after 1948. This standard, which was issued in 1967 under the National Traffic and Motor Vehicle Safety Act (Safety Act), specifies dimensions for tires used on passenger cars and requires that the tires meet specified strength, resistance to bead unseating, endurance, and high speed requirements, and be labeled with certain safety information. FMVSS No. 109 applies to passenger car (P-metric) tires produced for use on passenger cars, multipurpose passenger vehicles (MPV), and light trucks (sport utility vehicles (SUV), vans, minivans, and pickup trucks). The standard was adopted from the Society of Automotive Engineers (SAE) recommended practice J918c, *Passenger Car Tire Performance Requirements and Test Procedures*, which was first issued by the SAE in June 1965.<sup>12</sup> The current FMVSS No. 109 includes four performance requirements for tires:

- A strength test, which evaluates the strength of the reinforcing materials in the tire;
- A resistance-to-bead unseating test, which evaluates how well the tire bead is seated on the rim (regulating the tire-rim interface guards against sudden loss of tire air pressure when a tire is subjected to lateral forces such as during severe turning maneuvers);

- An endurance test, which evaluates resistance to heat buildup when the tire is run at or near its rated load nonstop for a total of 34 hours; and

- A high-speed test, which evaluates resistance to heat buildup when the tire is run at 88 percent of its maximum load at speeds of 75 mph, 80 mph, and 85 mph for 30 minutes at each speed.

For the purposes of testing tires to determine their compliance with these requirements, the standard specifies values for several factors, such as tire inflation pressure, the load<sup>13</sup> on the tire, and the rim on which a tire is mounted. The standard specifies permissible inflation pressures (or wheel sizes, in the case of bead unseating test) to facilitate compliance testing. The standard requires that each passenger car tire have a maximum permissible inflation pressure labeled on its sidewall (S4.3). Section 4.2.1(b) lists the permissible maximum pressures: 32, 36, 40, or 60 pounds per square inch (psi) or 240, 280, 290, 300, 330, 340, 350, or 390 kiloPascals (kPa). A manufacturer's selection of a maximum pressure has the effect of determining the pressures at which its tire is tested. For each permissible maximum pressure, Table II of the standard specifies pressures at which the standard's tests must be conducted. The intent of this provision is to limit the number of possible maximum inflation pressures and thereby reduce the likelihood of having tires of the same size on the same vehicle with one maximum load value, but with different maximum permissible inflation pressures.

Closely related to FMVSS No. 109 is FMVSS No. 110, *Tire selection and rims*, 49 CFR 571.110. FMVSS No. 110 requires that each passenger car be equipped with tires that comply with FMVSS No. 109, that tires on the cars be capable of carrying the maximum loaded vehicle weight, that the rims on the car be appropriate for use with the tires, and that certain information about the car and its tires appear on a placard in the passenger car. FMVSS No. 110 also specifies rim dimension requirements and further specifies that, in the event of a sudden loss of inflation pressure at a speed of 97 km/h (60 mph), rims must retain a deflated tire until the vehicle can be stopped with a controlled braking application. FMVSS No. 110 initially became effective in April 1968.

FMVSS No. 117, *Retreaded pneumatic tires*, 49 CFR 571.117, establishes performance, labeling, and

possible number because the tire might not have caused the crash, nor the highest number of cases because not all crashes with tire problems might have been coded by the police.

<sup>11</sup> Based on the consistency in the overall numbers of tire problems in FARS during the past eight years, the agency has not deemed it necessary to update the injury numbers in the more intricate analysis of NASS-CDS data. We believe that there would be almost no change in the target population if a few more recent years, e.g., 1999–2001, were included in the NASS-CDS analysis.

<sup>12</sup> SAE is an organization that develops voluntary standards for aerospace, automotive and other industries. Many of SAE's recommended practices are developed using technical information supplied by vehicle manufacturers and automotive test laboratories.

<sup>13</sup> Load percentages stated throughout this document, unless otherwise specified, are based on the sidewall maximum rated load.