

representative of real world failures in the field, (2) tires with proven safe field performance will not pass the proposed FMVSS No. 139 due to tread chunking caused by excessive heat build-up due to high speed on curved surface and high load conditions, and (3) tire design changes/compromises to reduce heat-induced tread chunking will negatively impact other safety performance characteristics (e.g., wet traction, wet handling, dry traction).

Public Citizen urged the agency to adopt a higher load of 100/110/115 percent to provide for loading conditions of heavier commercial vehicles.

After studying the effects of the test parameters on the failure rates for the proposed endurance test, the agency has decided to lower the load percentages to 85/90/100 percent of the maximum load rating. The 5% decrease in load in the first test step and, more importantly, the 10% decrease in the second and third test steps are adopted to offset the effect of the temperature increase that occurs on the curved surface of the test wheel.

c. Inflation Pressure

For LT tires, RMA recommended higher inflation pressures claiming that higher inflation pressures help offset the increased deflection and higher temperatures experienced by LT tires on the test wheel which makes the stringency of the test for LT tires more significant than that experienced by P-metric tires. RMA's data, however, indicates that LT tires also experience higher temperatures than P-metric tires when tested on a flat surface.³⁰

The inflation pressures contained in this final rule remain unchanged from those proposed in the NPRM. Since LT tires experience higher temperatures than P-metric tires under real world conditions, the agency sees no need to adjust the test stringency in attempt to make equivalent the thermal levels experienced by LT tires and P-metric tires on the test wheel.

The inflation pressure of 180 kPa represents a 25 percent under-inflation for 240 kPa maximum inflation pressure tires and is the same inflation pressure currently required for the endurance test in FMVSS No. 109. Tires tested to more severe levels of underinflation, e.g., 160 kPa, failed much sooner into the endurance test than those tested at 180 kPa.

³⁰ Based on RMA's DOE, the temperature differential between P-metric tires and LT tires on a road test wheel is 28° C, compared to 21° C on a flat surface.

d. Speed

For LT tires, RMA recommended a lower test speed of 110 km/h claiming that a lower test speed makes the stringency of the test for LT tires equivalent to that for P-metric tires. Goodyear recommended 104 km/h for all tires stating that the combined load and speed of the test produces excessive temperature conditions on a test wheel.

The speed contained in this final rule remains unchanged from that proposed in the NPRM. The test is conducted at 120 km/h (75 mph). The current endurance test in FMVSS No. 109 is conducted at 80 km/h (50 mph). An 80 km/h test speed may have been an appropriate test speed in 1968 when initially proposed for bias ply tires. However, today, it is too low a speed for evaluating the endurance of today's tires given current vehicle performance capabilities and speed limits.³¹ In addition, speed limits on interstate highways across the U.S. are now as high as 75 mph.

The agency considered RMA's recommendation for a lower test speed for LT tires. RMA's DOE showed higher tire temperatures for LT tires compared with P-metric tires, both on the flat surface and on the curved test wheel. We acknowledge that LT tires run hotter than P-metric tires but see no need to try to make the stringency levels equivalent in laboratory testing if they do not run at equivalent levels on the road. In the real world, P-metric tires and LT tires are often operated on light vehicles in the same manner, e.g., same speeds, same attention, or lack thereof, to proper inflation levels. Additionally, the agency adjusted the parameters for load, duration, and temperature to achieve a more realistic and practicable test. Given that vehicles equipped with LT tires are operated at similar speeds as vehicles equipped with P-metric tires, the agency does not accept this suggestion.

e. Duration

The duration specified for the endurance test has been lowered to 34 hours from the 40 hours proposed in the NPRM.

The agency's confirmation testing to the endurance parameters proposed in

³¹ According to *Automotive News* (5/14/01), "since 1981, average horsepower has risen 79 percent and vehicle weight has grown 21 percent." The power to weight ratio has increased over the past 10 years based on data on selected mid-priced Ford, Chevrolet, Pontiac, Toyota, and Honda vehicles ranged from about 70 to 90 horsepower (HP) per ton. (Ward's *Automotive Yearbooks*, 1990 and 2000). In 1995, the federally-mandated 55 mph speed limit was repealed. Since that time, numerous States have increased speed limits up to 75 mph.

the NPRM indicated that the failure rate was 27 percent for P-metric tires and 40 percent for LT tires. A majority of these failures occurred between the 35th and 40th hours of the 40-hour test. The failure mode for these tires was chunking of the tire tread. Chunking is the breaking away of pieces of the tread or sidewall. Chunking may be an early indicator of other potential tire problems, but the agency, at present, does not have data indicating the frequency with which chunking occurs in service or the rate at which other tire problems are precipitated by chunking.

The agency anticipates that with the duration reduced to 34 hours, a lower percentage of tires will fail the test because of chunking. In anticipation of concerns that the lowered duration reduces the stringency of the test, the agency notes that for the 34-hour duration, the maximum test load is achieved after 10 hours from initiation of the test, while for the 40-hour duration that was proposed in the NPRM, the maximum test load is only achieved after 18 hours. Additionally, the final load step is 2 hours longer (24 hours) than the one proposed in the NPRM (22 hours). For these reasons, the agency considers the 34-hour test as possibly more stringent than the proposed 40-hour test.

Ford recommended extending the duration of the test by adding an additional 48-hour test step at a load equaling 130 percent of the maximum load rating of the tire. Ford did not provide any data or test results to support this recommendation.

3. Low Inflation Pressure Performance Test

The TREAD Act requires that light vehicles be equipped with a tire pressure monitoring system, effective November 1, 2003, to indicate to the driver when any of the tires on his vehicle is significantly underinflated. NHTSA established 20 psi (140 kPa) as a low pressure threshold at or above which the low pressure lamp must be activated in its recent final rule on TPMS. (67 FR 38704, June 5, 2002)

NHTSA includes in the new light vehicle tire standard a low inflation pressure test, the Alternative 1, Low Pressure—TPMS test, to ensure a minimum level of endurance and/or high speed performance/safety when operated at a significant level of under-inflation. The parameters for this test, which the tire must complete without failure, are as follows:

- (1) Load: 100 percent
- (2) Inflation pressure: 140 kPa (20 psi) for P-metric
- (3) Test speed: 120 km/h (75 mph)