

- (4) Duration: 90 minutes at the end of the 34-hour endurance test
- (5) Ambient temperature: 38° C
- A tire complies with the requirements if, at the end of the test, there is no

visual evidence of tread, sidewall, ply, cord, inner liner, or bead separation, chunking, broken cords, cracking, or open splices, and the tire pressure is not less than the initial test pressure.

The following table provides a comparison of the low inflation pressure performance parameters proposed in the NPRM and those established in FMVSS No. 139.

TABLE 4.—LOW INFLATION PRESSURE TEST

Test parameters	Proposed Alternative 1	Proposed Alternative 2	FMVSS No. 139 As adopted
Ambient (°C)	40	40	38
Load (%)	100% of maximum load rating on tire.	67% of maximum load rating on tire.	100% of maximum load rating on tire
Inflation Pressure (kPa):			
Standard load P-metric	140	140	140
Extra load P-metric	160	160	160
LT-load C	200	200	200
LT-load D	260	260	260
LT-load E	320	320	320
Speed (km/h)	120	140/150/160	120
Duration (mins)	90 (30/30/30)	90 (30/30/30)	90 (30/30/30)

RMA expressed support for Alternative 1, substituting a lower test speed, 110km/h, for LT tires instead of the proposed 120 km/h. RMA also stated that thermal runaway occurred on all the tires that it tested to the Alternative 2 test parameters. Both the Alliance and Ford suggested that the test be run on tires after they had been subjected to an aging test. Consumers Union recommended that the test duration of Alternative 1 be increased to 4 hours to better simulate the distance traveled (300 miles) on a tank of fuel.

The adopted test, Alternative 1, establishes a linkage between the proposed requirements of the tire pressure monitoring system standard and the endurance test for the tire standard upgrade requirements. It is predicated upon the notion that a low pressure test is most appropriate on tires that have completed the endurance test because a significantly underinflated condition for a tire is more likely to occur in a tire after several weeks of natural air pressure loss or due to a slow leak.

Besides nearly unanimous support from commenters, the agency believes that the parameters of this test more closely represent real world conditions. For instance, it is more likely that vehicles, particularly passenger vehicles, will travel at speeds closer to 120 km/h (75 mph) than 160 km/h (90 mph) and will be loaded closer to a 100% condition than a 67% condition. In essence, this alternative closely mirrors conditions of long distance family travel and would assist in ensuring that tires will withstand conditions of sudden or severe underinflation during highway travel in highly loaded conditions. Additionally, the agency believes that this test

provides an extra safeguard to ensure that tires that were able to successfully complete the endurance testing can also complete an additional 90-minute test at low inflation pressures.

4. Road Hazard Impact

For a road hazard impact performance requirement, the agency had proposed the adoption of the current SAE Recommended Practice J1981, *Road Hazard Impact Test for Wheel and Tire Assemblies* (Passenger Car, Light Truck, and Multipurpose Vehicles). This test had been developed by SAE to provide a uniform test procedure for evaluating the road hazard impact on wheel and tire assemblies.³² Results from agency testing of 60 tires according to this procedure demonstrated no failures. Further, post-test inspection using visual methods, shearography, and x-ray revealed no evidence of damage to any of the tires.

In response to our proposal, commenters unanimously suggested that the proposed SAE procedure was not properly defined to test for tire-to-hazard impact worthiness. RMA argued that the test was originally developed as a wheel damage test and has very limited value as a tire test. Also, they argued that it was originally adopted to evaluate bias ply tires and is unnecessary for testing radial tires. The Alliance suggested that the current plunger test be retained until the agency develops a test that correlates with actual field performance. Ford also recommended that the current plunger

test be retained but also revised to contain a higher load value and a revised test rim capable of accommodating the higher load without exhibiting “bottoming out.” Ford stated that it uses a force value twice as high as that specified in FMVSS No. 109 and its tires have experienced failures when tested to this specification. Commenters also questioned the practicability of the proposed test given the expected cost of new equipment to perform the test and the perceived lack of benefits exhibited by the absence of failures in NHTSA’s research.

The agency’s research on this test consisted of sixty tires tested in the agency’s Phase 1A laboratory tire strength tests. All were P205/R15 size, with aspect ratios of 55, 65, or 75. Each tire was initially strength tested using one of the four following procedures: (1) SAE J1981 Road Hazard Impact test, with wedge-shaped striker, (2) SAE J1981 Road Hazard Impact test, with plunger shaped striker, (3) current FMVSS No. 109 tire strength test, and (4) modified FMVSS No. 109 tire strength test. All tires were submitted for post-test damage evaluation using visual inspection, x-ray, and shearography. Twenty of these tires were then subjected to the current FMVSS No. 109 high speed performance test, and then resubmitted for damage evaluation.

Only one of the 60 tires experienced air loss or damage detectable by the three evaluation methods. This tire experienced tread break and rapid air loss during a modified FMVSS No. 109 tire strength test. Tests on four of the 20 tires subjected to the SAE J1981 Road Hazard Impact tests, with wedge-shaped striker, resulted in damage to the rim, even though no air loss or tire damage

³² The test machine specified in this recommended practice positions the tire so that the striker impacts it across the width of the tire tread with a free falling 54 kg pendulum striker. The impact force must be applied at five equally spaced points around the circumference of the tire.