Tire Light Truck High Speed Endurance

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations**.**

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This standard provides a method for testing the high speed endurance of light truck tires under controlled conditions in the laboratory on a test wheel. This standard is intended to provide a relative assessment of a tire's maximum high speed performance at a test condition severity representative of use on a light truck.

1.2 Applicability. This standard is applicable for all light truck tires.

1.3 Remarks.

1.3.1 Limitations. The test conditions specified in this procedure are intended to simulate the most severe conditions a driven light truck tire can be expected to see in service. However, General Motors has not, at this time, been able to accurately evaluate the tire endurance performance involving the effect of driving torque. Consequently, reasonable engineering judgment was utilized to include existing correlation testing between on-road and laboratory, previous passenger car tire test results, and vehicle road load comparisons for light trucks and passenger cars, in establishing the laboratory test conditions specified in this procedure.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM F551 SAE J1561 SAE J1633

2.2 GM Standards/Specifications.

GMW16590

2.3 Additional References.

The Tire and Rim Association (TRA), Incorporated, Copley, OH (www.us-tra.org)

3 Resources

3.1 Facilities. GM Test Improvement Process (TIP) approved laboratory or location.

3.2 Equipment.

3.2.1 Roadwheel, 1.7 m, meeting the requirements of ASTM F551, SAE J1633, and SAE J1561.

3.2.2 Wheels appropriate for test tire per The Tire and Rim Association (TRA), Incorporated, Yearbook or equivalent standards body.

3.3 Test Vehicle/Test Piece. Test tires for the North American market.

3.4 Test Time.

Calendar time:	1 day
Test time:	4.5 hours
Coordination time:	1 hour

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3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Test technician shall be qualified on the basis of appropriate education, training, experience, and/or demonstrated skills.

4 Procedure

4.1 Preparation.

4.1.1 Unless otherwise specified in the test request, four tires are to be tested in the as received condition.

4.1.2 In tests comparing unique tire designs, all test tires should be approximately of the same age and shall have been stored at essentially the same conditions.

4.1.3 Mount and inflate a new tire on the test rim using acceptable mounting procedures.

4.1.4 Test assemblies shall be dynamically balanced.

4.1.5 Thermally condition the tire and wheel assembly at the ambient test room temperature for not less than 3 h.

4.1.6 Readjust the tire pressure to test inflation pressure.

4.2 Conditions.

4.2.1 Environmental Conditions. An ambient test room temperature of 38 °C ± 3 °C (100 °F ± 5 °F) shall be maintained during the test.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.2.2.1 Load.

4.2.2.1.1 Standard test load is 100% of TRA load at 250 kPa for radial and at 200 kPa for diagonal ply, bias belted.

4.2.2.1.2 Special usage test load will be determined by using the appropriate procedure from the TRA Engineering Design Guide for calculation of light truck tire load ratings at the special usage inflation pressure as specified in 4.2.2.2.2.

4.2.2.2 Inflation Pressure.

4.2.2.2.1 Standard inflation pressure will be 250 kPa (radial tire, cold, capped) or 200 kPa (bias ply tire, cold, capped).

4.2.2.2.2 Special usage inflation pressure is as specified by vehicle manufacturer.

4.3 Instructions.

4.3.1 Mount the tire and wheel assembly on the test axle.

4.3.2 Apply the test load to the tire.

4.3.3 Check and, if necessary, adjust the loaded tire's inflation pressure immediately before testing. The inflation pressure is to be capped at this point in the test and no further adjustments are permitted.

4.3.4 The test load must be kept within the tolerances specified in SAE J1633.

4.3.5 Accelerate the roadwheel to the initial test speed in 10 minutes. The initial test speed is the goal test speed of the tire less 20 km/h (12.4 mph). Use a minimum of ten (10) speed increments to achieve a uniform acceleration from 0 km/h to the initial test speed. See Appendix A, Table A1 for the Initial Test Speed and Table A2 for the Test Speed Step Intervals.

4.3.6 Duration at initial test speed will be 10 minutes following the acceleration time.

4.3.7 Accelerate to the second test speed, initial test speed +10 km/h (6.2 mph). There is no time requirement for this acceleration or any of the remaining accelerations.

4.3.8 Duration at the second test speed will be 10 minutes.

4.3.9 Accelerate to the goal test speed, second test speed +10 km/h (6.2 mph).

4.3.10 Duration at goal test speed will be 30 minutes.

4.3.11 Successive speed steps after the goal speed step are made in 10 km/h (6.2 mph) intervals.

4.3.12 Duration at each successive speed step after goal speed step will be 30 minutes.

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4.3.13 Continue with successive speed steps, as described immediately above, until some observable structural degradation of the tire occurs. Structural degradation examples and codes are given in Table C1, Appendix C, and briefly defined in the glossary.

4.3.14 Record all data as required in Section 5.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Four (4) tires must complete the goal speed step without exhibiting any structural degradation, to be assigned a speed category designation equal to or less than that associated with the goal speed by TRA.

5.3 Test Documentation. The test results documentation should include the following:

- Test results report (generated by Global Tire Wheel Test System (GTWTS) if submitting Extensible Markup Language (XML) files).
- Test result data files (XML format).

The list of required test data parameters is given in Table B1, Appendix B. A sample report is given in Appendix D, Data Sheet D1.

Note: For data being loaded into the GTWTS, submit electronically the test results data files (XML format) and other supporting files listed. GMW16590 defines the electronic file details, (e.g., file types, file naming convention, and detailed file formats) for the GTWTS.

6 Safety

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

6.1 Prior to start of test, the tire and test wheel must be free of obvious defects, as judged by visual inspection. In particular, the bolt holes, the valve, and the base of the rim flange must not be worn excessively.

6.2 This test is intended to cause structural degradation of the test tire, and high energy fragments may be thrown from the tire. Adequate machine safeguards, fire and personal protection equipment shall be provided at all times.

7 Notes

7.1 Glossary.

Ambient Temperature: This is the temperature of the air measured during a high speed test at a fixed location near the tire. The fixed location of ambient temperature measurement is defined as a point on the rotational axis of the tire, 0.3 m (12 in) from the plane touching the nearest tire sidewall, or at a point where an equivalent temperature exists.

Bead Separation: A breakdown of the bond between components in the bead area.

Capped Inflation Pressure: The process of inflating the tire to a specified pressure and placing a cap on the valve stem. This will allow the inflation pressure to build up as the tire temperature increases during the test procedure.

Chunking: The breaking away of pieces of the tread or sidewall.

Cord Separation: The parting of the cords from adjacent rubber compounds.

Cracking: The parting within the tread, sidewall, or inner liner of the tire extending to cord material.

Goal Speed: Predetermined 30 minute speed step required for obtaining speed category designation.

Inner Liner Separation: The parting of the inner liner from cord material in the carcass.

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