Tire Low Speed Uniformity Test – Assembly

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 document provides details for testing passenger car and Light Truck (LT) tires and wheel assembles for low speed uniformity, on Low Speed Uniformity (LSU) machines. This document is intended to provide a way of gathering data on a uniform basis.

1.2 Applicability. This procedure applies to all passenger car and light truck tire testing uniformity machines.

1.3 Remarks.

1.3.1 The tire LSU measured values of interest include radial and lateral composite force peak to peak, radial and lateral harmonic force variation (1st through 10th order), radial and lateral harmonic angles (1st through 10th order), conicity, and plysteer.

1.3.2 This procedure applies to the standard testing of tires on the LSU machine running at 60 rpm, zero slip angle, and zero inclination angle under an applied load against a 0.854 m diameter high friction (i.e., knurling, sprayed tungsten carbide, adhered tungsten carbide crystals, etc.) drum, at capped inflation pressure.

1.3.3 LSU data is used in such applications as vehicle sensitivity tests, plant audits, and analysis of tires from complaint vehicles.

2 References

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

2.1 External Standards/Specifications.

SAE J332

2.2 GM Standards/Specifications.

GMW16590

2.3 Additional References.

Global Tire and Wheel Test System (GTWTS) database (https://iamteam.share.gm.com/Lists/GLENDA_Schedule/DispForm.aspx?ID=910) (ID)

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3 Resources

3.1 Facilities.

3.1.1 Machine calibrations should be done annually, and should include a process to monitor the machines measurement performance (a scheduled control tire).

3.2 Equipment.

3.2.1 All details associated with the test apparatus are included in SAE J332. See Figure 1.

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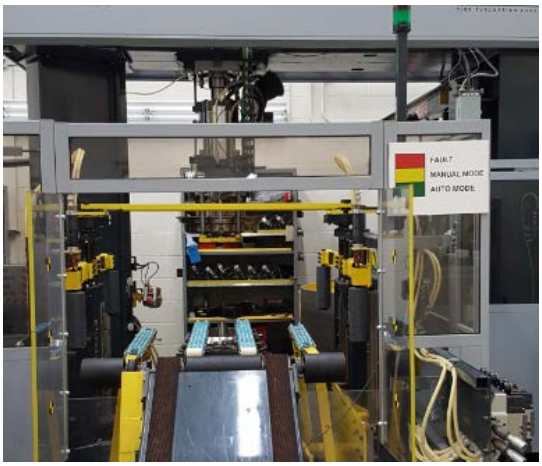

Figure 1: Tire and Wheel System (TWS) LSU Machine

3.3 Test Vehicle/Test Piece. Tires of specified nominal size, meeting dimensional requirements of Tire and Rim Association (T&RA) or European Tyre and Rim Technical Organization (ETRTO).

3.4 Test Time.

Calendar time:	0.5 days
Test time:	1 hours
Coordination time:	1 hours

3.5 Test Required Information. The following test information is required for testing and documenting the test:

- Tire Construction Number.
- Supplier.
- Load Index.
- Tire Type.
- Directional Tread.
- Belt Material.
- Part Status Code.
- Tire Size.
- Tire Pressure at Defined Load Index.
- Speed Rating.
- Tire Design Category.
- Construction of Tire.
- Tire Ply Material.
- Test Load.
- Test Tire Pressure.
- Test Speed

3.6 Personnel/Skills. Personnel with proper laboratory safety and test equipment training.

4 Procedure

4.1 Preparation.

4.1.1 All debris must be removed from the tire (i.e., rocks, tape, and dirt).

4.1.2 All tires should be stored stacked and not stood upright on edge.

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4.1.3 Tires should be stored at an ambient temperature of 21.0 °C ± 3.0 °C, to allow time for the tire to stabilize (minimum time of 4 h).

4.1.4 The LSU machine should be allowed time to warmup (30 minutes) and cycled (hydraulic cylinders) several times before testing.

4.2 Conditions.

4.2.1 Environmental Conditions.

4.2.1.1 Ambient temperature of 21.0 °C ± 3.0 °C.

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 Speed: 60 rpm (driven spindle or load wheel).

4.2.2.2 Load: Passenger car tire (P-type) test load shall be 70% of Maximum Load, and LT tire test load shall be 70% of the 350 kPa load rating. Loads are per T&RA or ETRTO, as applicable.

4.2.2.3 Inflation: Passenger car (P-type) inflation shall be 210 kPa, and LT tire inflation shall be 350 kPa.

4.2.2.3 The tire should be indexed/marked (with reflective tape) at wheel valve location. This will serve as the tire's zero reference point when using an external encoder sensor (once per revolution pickup), for angle measurements. See Figure 2.

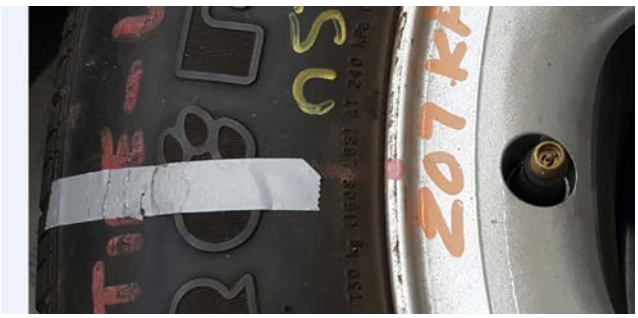

Figure 2: Tire Zero Reference Point Marked by Reflective Tape

4.3 Instructions.

4.3.1 LSU Test Instruction.

4.3.2 Install the LSU assembly tooling on the machine; this will depend on the LSU equipment configuration.

4.3.3 Measure the radial runout (Figure 3) on the controlled centering surface, which should be ≤ 0.0003 in.

Figure 3: Radial Runout Measurement Setup

4.3.4 Adjust tooling to lower the runout if needed.

4.3.5 Install the assembly on the machine.

4.3.6 Set the final test inflation press for the tire/wheel assembly.

4.3.7 With reflective tape, index/mark the assembly on the tire, at the wheel valve location.

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