



Tire Low Speed Uniformity Test – Tire Only

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. The purpose of this document is to describe the method for determining tire low speed uniformity for passenger car and light truck tires under controlled laboratory conditions.

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 Low Speed Uniformity (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, zero inclination angle, under an applied load against a 0.854 meter 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/GLENDASchedule/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. Details associated with LSU test equipment are included in SAE J332. See Figure 1.

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Page 1 of 9

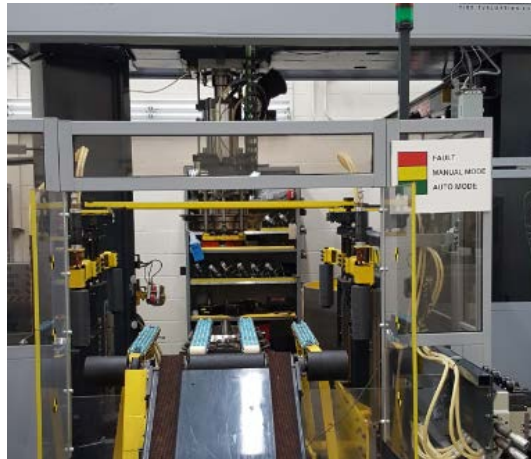


Figure 1: Tire and Wheel System (TWS) LSU Machine

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

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

- Tire Construction Number.
- 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.

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August 2017

Page 2 of 9

4 Procedure

4.1 Preparation.

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

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

4.1.3 Tires should be stored at an ambient temperature of $21.0\text{ }^{\circ}\text{C} \pm 3.0\text{ }^{\circ}\text{C}$, 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.

4.2.2.1 Ambient temperature of $21.0\text{ }^{\circ}\text{C} \pm 3.0\text{ }^{\circ}\text{C}$.

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 Test Loads and Pressures are indicted on the test request. The standard setting for passenger cars is 70% of Maximum Load at 210 kPa, and for LT truck is 70% of Maximum Load at 350 kPa, as described by T&RA.

4.2.2.3 The tire should be orientated with the tire curb (outboard) side up.

4.2.2.4 The tire should be index/marked (with reflective tape) at the letter O, in "DOT" of the sidewall. This will serve as the tire's zero reference point, when using an external encoder sensor (once per revolution pickup), for Radial Forces Harmonic Angle (RFHA) measurements. See Figure 2.

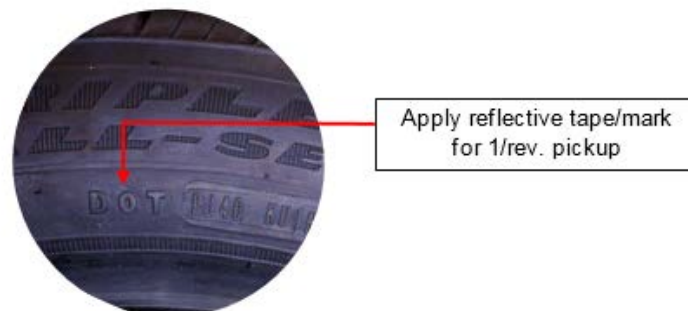


Figure 2: Tire Zero Reference Point

4.2.2.5 Recommended repeatability test of 5 cycles per tire.

4.2.2.6 Tire should be tested in both clockwise and counter-clockwise directions.

4.3 Instructions.

4.3.1 Initialize the LSU applications program.

4.3.2 Enter the proper test parameters (load, tire inflation pressures, and physical tire characteristics) for the test tire. This information should be identified on the test request.

4.3.3 Install the proper sized precision wheel, for the tire to be tested.

Note: When using a stepped rim, insure there is clearance between the lower rim step and the tire rim protector.

4.3.4 Measure the precision wheel radial and lateral runouts for both upper and lower halves, which should be within the manufacturer's specifications (≤ 0.0003 in). See Figures 3 and 4. If runout is greater than manufacturer's specifications, seek a solution to correct runout issue.

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Page 3 of 9



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