



Tire Tread Groove Depth Measurement Test

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. To determine the depth of tire grooves from the tread surface to the bottom of the groove avoiding tread depth indicators.

1.2 Applicability. Passenger car, compact spare, and light truck tires.

1.3 Remarks. The groove depth of a tire is measured in each distinct circumferential groove or at four (4) specified locations across the width of the tread for tires without distinct grooves, and at a minimum of six (6) equally spaced locations around the circumference of the tire.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW16590

2.3 Additional References.

- European Tyre and Rim Technical Organization (ETRTO)
- National Institute of Standards and Technology (NIST)
- Rubber Manufacturers Association (RMA)
- Tire and Rim Association (T&RA)

3 Resources

3.1 Facilities. Not applicable.

3.2 Equipment.

3.2.1 Tire pressure gauge.

3.2.2 Tread depth gauge. Any mechanical, optical, or electronic device capable of measuring groove (void) depth can be used. Only the mechanical gauge method is described here.

3.2.2.1 The apparatus shall consist of a mechanical depth gauge fitted with a foot through which a spindle passes.

3.2.2.2 The foot may have any of a variety of shapes, including but not limited to cylindrical, semi-cylindrical, and rectangular.

3.2.2.3 The reading of the depth gauge shall be accurate to within ± 0.025 mm (0.001 in) over a range of 15 mm (0.5 in).

3.2.2.4 The smallest scale division, resolution, shall be at least 0.025 mm (0.001 in).

3.2.2.5 The gauge shall have provision for adjusting the gauge reading to zero when the foot is pressed against a flat surface.

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3.2.2.6 Gauge calibration must be traceable to National Institute of Standards and Technology (NIST) or other standard body.

3.2.2.7 A control block may be used for a reference if operator suspects that gauge is not working properly. If operator continues to suspect the gauge is not working properly, the gauge can be recalibrated. The control block is for reference only and is not calibrated.

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: 2 d
Test time: 24.5 h
Coordination time: < 1 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. All applicable lab and safety training.

4 Procedure

4.1 Preparation.

4.1.1 Mount the tires on the specified wheels using the Rubber Manufacturers Association (RMA) recommended practice. Never inflate a tire over 275 kPa (40 psi) to seat the beads.

4.1.2 Inflate to the required pressure. See Appendix A, Table A1.

4.1.3 Allow the tire to stand for 24 h at ambient temperature at the test inflation pressure. The tire shall be in thermal equilibrium with the environment in which it is being measured.

4.1.4 Prior to taking measurements, recheck inflation pressure and adjust if necessary.

4.1.5 The tire must be dry and free of any foreign material that would interfere with accurate measurement.

4.1.6 Avoid rubber vents on the tread during measurement or remove them, leaving no projections above the tread surface in the area where measurements are being made.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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 For inflation pressures, see Appendix A, Table A1.

4.2.2.2 Tires standardized by an organization other than T&RA and ETRTO are to be tested at the same inflation pressure as the equivalent T&RA and ETRTO size. Use alternate pressures only if specified by the requesting Tire Engineer.

4.3 Instructions.

4.3.1 Zero tread depth gauge by placing the foot of the gauge against a non-deformable flat surface such as a glass plate or machined metal surface, and adjust dial to zero. An optional method is to place the foot of the gauge against a flat spot on the tread of the test tire and adjust dial to zero.

Note: The tread depths measured when zeroing on the non-deformable surface will be slightly larger than those measured when zeroing on rubber. Typical differences between results obtained using the standard versus optional method should be documented according to local region procedures.

4.3.2 Place the foot of the gauge so that it bridges adjacent ribs or lugs over the area to be measured, avoiding treadwear indicators, and so that the spindle makes perpendicular contact with the groove or void bottom. This single measurement characterizes the groove (void) depth.

4.3.3 Record the groove depth measured at a minimum of six equally spaced locations around each rib or circumferential line avoiding treadwear indicators. Repeat the same set of measurements for each groove.

4.3.3.1 Groove Number 1 shall be the outboard groove as the tire is intended to be mounted on the vehicle. This is also sometimes referred to as the cosmetic side of the tire.

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4.3.3.2 If the tread pattern is such that separate circumferential grooves are not easily identified, measure the groove depths at four (4) locations across the width of the tire, as specified in Appendix A, Table A3 from the centerline of the tire. Round the distances calculated to the nearest millimeter. If a particular tire design prohibits the use of these locations, approval from requesting engineer is necessary for alternate locations. Reference example in Appendix A, Table A2.

5 Data

5.1 Calculations.

5.1.1 Groove Average Depth: The average of all tire groove depth measurements made in the same groove or circumferential line.

5.1.2 Average Tire Tread Depth: The average of all tire groove (void) depth measurements.

5.2 Interpretation of Results. See sourcing documents.

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).
- Completed datasheets.

See Appendix B, Data Sheet B1 for a sample data sheet and Appendix C, Figure C1 for a sample report.

Note: For data being loaded into the GTWTS, submit electronically the test results data files (XML format) and other supporting files. 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.

7 Notes

7.1 Glossary.

Ambient Temperature: Ambient air temperature of test location.

Centerline: The line around the circumferential tread surface defined as the intersection of the tread surface with the center plane of the tire that is normal to the tire's natural rotation direction.

Circumferential Line: Any real or imaginary line on the tread surface in a plane perpendicular to the axis of rotation of the tire.

Commercial Truck Tire: A tire developed primarily for use on commercial trucks.

Groove: An essentially continuous circumferential or lateral channel molded or cut in the tread rubber.

Groove (Void) Depth: A measurement of the perpendicular distance from a real or calculated reference plane defined by the edges of the two adjacent ribs, lugs, and the lowest point of contact in the groove (void).

Light Truck Tire: A tire developed primarily for use on light trucks.

Lug: A discontinuous projection molded in the tread rubber that makes contact with the pavement.

Nominal Section Width: The nominal width of the tire (lateral direction) in millimeters as stated in the tire size. For example, a P235/50R18 has a nominal section width of 235 mm.

Passenger Car Tire: A tire developed primarily for use on passenger cars.

Test Tire Inflation Pressure: The stabilized tire inflation pressure at ambient temperature. Test tire inflation pressures can be found in Appendix A, Table A1.

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