



Brake Lining Thickness Measurement

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 procedure documents the method used to measure brake lining thickness and wear, including lining taper wear, during vehicle or inertia dynamometer tests.

1.2 Applicability. This procedure is applicable to all passenger car and light truck disc brake corners.

1.3 Remarks. This procedure is part of the Test Improvement Process (TIP) accreditation for the GMW14394 and GMW14935 procedures.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14394 GMW14935

2.3 Additional References.

- Global Document Management (GDM), <https://documents.gm.com/gdm3/component/main> (ID)
- Mitutoyo America Corporation, Aurora, Illinois (www.mitutoyo.com)

ID = This website is limited to internal usage within General Motors and shall not be used outside this company. Contact the GM Lead Engineer for further information.

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Brake Pad Thickness Measurement Tool. A thickness measurement tool (micrometer) with 0.001 mm resolution and a clutched spindle is required. This tool shall have verified repeatability. The anvil end of the micrometer shall be spherical to contact drilled reference points in the steel backing plate. The spindle end of the device shall be flat, to contact the lining material surface. (See Figure A1 in Appendix A.)

3.2.2 Drill Press. A drill press with a depth stop.

3.2.3 Engraver.

3.3 Test Vehicle/Test Piece. Brake Linings.

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November 2016

Page 1 of 6

3.4 Test Time.

Calendar time: 1.0 days
Test hours: 0.25 hours/test piece
Coordination hours: 0.25 hours

3.5 Test Required Information.

 Not applicable.

3.6 Personnel/Skills. One (1) technician or (1) engineer capable of performing the duties described in Section 4 is required.

4 Procedure

4.1 Preparation.

4.1.1 Mark eight (8) measurement points on the pad backing plate. (See Figures A2 and A3 in Appendix A.) Use six (6) points if eight (8) are not possible. Measurement points shall be located on the flat portion of the lining material avoiding chamfers and slots that would affect measurement accuracy. Half ($\frac{1}{2}$) of these points shall be equally spaced along the lining Inner Diameter (ID) and half ($\frac{1}{2}$) equally spaced along the lining Outer Diameter (OD).

4.1.2 Use a 5 mm (or 13/64 in) drill bit and drill through coatings and noise insulators into the steel portion of the backing plate at one of the measurement points. Set the depth stop on the drill press where the hole is created at the full diameter of the drill bit. Drill the remaining holes.

4.1.3 Using the engraver, mark the measurement points with numbers and mark the test part with the test identification number.

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.

4.3 Instructions.

4.3.1 Remove excess dust that could affect the thickness measurement.

4.3.2 Measure and record the thickness at each measurement point.

4.3.3 Lining wear can be assessed from the following: Subtract the final measurement from the initial measurement to get the lining wear at that point. For radial taper wear, subtract the lining wear at point five (5) from the lining wear at point one (1). Repeat for points six (6) and two (2), seven (7) and three (3), eight (8) and four (4), respectively. For tangential taper wear, subtract the lining wear at point four (4) from the lining wear at point one (1) for the OD, and subtract the lining wear at point eight (8) from the lining wear at point five (5) for the ID. The slope of the taper ($\mu\text{m}/\text{mm}$) is calculated by dividing the wear difference by the radial or tangential distance between the points.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Provide a sketch of the measurement point number and location on the inner and outer lining. Provide a table of the measurement point number and measured thickness at each test condition. For tapered lining wear assessment, a table of the slopes corresponding to the reference point measurements is created. (See Tables A1 and A2 in Appendix A.) In addition, a plot of overall lining wear at each reference point, for both the inner and outer lining, is created. (See Figure A4 in Appendix A.)

5.3 Test Documentation. Publish test information and results in an engineering test report stored in the Global Document Management (GDM) system.

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

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November 2016

Page 2 of 6

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