GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17138

Determination of Film Thickness

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 objective of this standard is to outline a procedure to determine thickness of functional or decorative films.

1.2 Applicability. Paint, decals, functional films.

1.3 Remarks. This standard describes the GM **preferred** method of measuring film thickness, which is outlined in ISO 2808, Paint and Varnishes – Determination of Film Thickness. Alternate methods may be acceptable where substrate materials or part geometry are not suitable for this procedure.

2 References

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

2.1 External Standards/Specifications.

ISO 2808

2.2 GM Standards/Specifications.

None

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 Microtome with traversing or rotary carbide blades.

3.2.2 Microscope with either an eyepiece that has a reticle of 100 units, or optoelectronic device capable of measuring sample length to within 0.001 mm.

3.2.3 Specimen holder or suitable materials to mount the sample on the microscope slide.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

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4 Procedure

4.1 Preparation.

4.1.1 Cut a 10 mm × 20 mm test sample from the part. Alternatively, a thin microtome wafer of approximately 1 mil (0.025 mm/0.001 in) in thickness placed between two (2) slides may be used in place of a 10 mm × 20 mm sample. For brittle coatings, a thicker sample may be required.

Note: Cutting the sample from the film side into the substrate, often yields the best cross-section for viewing.

4.1.2 If an optoelectronic device is not available for measurements, calibration of the microscope reticle is required prior to viewing samples. For the finest calibration, use thickness standards.

Note: For a rough calibration of the reticle, use a finely divided machinist ruler and note the number of reticle lines corresponding to 1 mm and 0.5 mm of ruler length.

4.2 Conditions.

4.2.1 Environmental Conditions. All testing shall be performed at room temperature unless otherwise noted.

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 Microtome the test sample on the end to be analyzed.

4.3.2 Mount the test sample 90 degrees to the microscope lens using putty or another suitable method that will hold the sample upright for viewing under the microscope.

4.3.3 View the sample from 100x to 1000x magnification, and take photos if software is available.

Note: All layers of film must be in focus simultaneously for the best measurements

4.3.4 Using reticle lines or computer software, measure the thickness of each layer in the film and report to the nearest 0.001 mm.

5 Data

5.1 Calculations. Total film thickness.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. The test report shall report the material identification, thickness of each layer, the total thickness of all the layers combined, and the location of where the sample was taken from the part.

6 Safety

This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

7 Notes

7.1 Glossary.

1 mil: 0.025 mm (one-thousandth of an inch)

7.2 Acronyms, Abbreviations, and Symbols.

ISO International Organization for Standardization

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Test to GMW17138

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