



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 method of measuring film thickness by means of a microtome, which is outlined in ISO 2808, Paint and Varnishes – Determination of Film Thickness.

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. < 8 h.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Test technician familiar with test facilities and equipment.

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 (1 micron).

5 Data

5.1 Calculations. Total film thickness.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. The test report shall include 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 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.

1 mil: 0.025 mm (0.001 in)

7.2 Acronyms, Abbreviations, and Symbols.

GSSLT Global Subsystem Leadership Team

ISO International Organization for Standardization

8 Coding System

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

Test to GMW17138