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IPC-TM-650
TEST METHODS MANUAL

Number	
2.2.18	
Subject	
Determination of Thickness of Laminates by Mechanical Measurement	
Date	Revision
12/94	
Originating Task Group	
MIL-P-13949 Test Methods Task Group (7-11b)	

1.0 Scope This test method is designed to determine the thickness of unclad or metallic clad laminate, with or without the cladding, using mechanical measurements.

2.0 Applicable Documents

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Method 2.3.6, Etching, Ammonium Persulfate

Method 2.3.7, Etching, Ferric Chloride

Method 2.3.7.1, Cupric Chloride Etching

Method 2.3.7.2, Alkaline Etching

3.0 Test Specimens Consult with the applicable specification for size or configuration, quantity, and location taken from the laminate.

3.1 Size Test specimens may be strips cut from the laminate and shall be 12.7 mm [0.5 in] wide, minimum. Sheets or cut-to-size panels may be used as specimens.

3.2 Sampling Unless otherwise specified, two specimens shall be taken from locations within the sampling that represent the centermost area and the edges, but no closer than 25.4 mm [1.0 in] from the edge, of the as-manufactured sheet.

4.0 Apparatus or Material

4.1 Micrometer with a minimum throat depth of 25.4 mm [1.0 in] and with accuracy of 0.0025 mm [0.0001 in], or equivalent.

4.2 Etching system capable of complete removal of metallic cladding. IPC Test Methods 2.3.6, 2.3.7, 2.3.7.1, or 2.3.7.2 shall be used for referee testing.

5.0 Procedure

5.1 Specimen Preparation

5.1.1 Method A, Metallic Cladding Removed This method is used to determine base laminate thickness by direct measurement of the laminate without cladding. It shall be used for qualification or referee testing.

5.1.1.1 Completely etch the test specimen in accordance with accepted industry practices.

5.1.2 Method B, As Manufactured This method is used to determine overall thickness of unclad or metallic clad laminates. It is used to determine base thickness of metallic clad laminates when evaluated in accordance with 5.3.2.2.2. Unless otherwise specified, it shall be used for product acceptance inspection.

5.1.2.1 The specimens shall be tested in the as-manufactured condition.

5.2 Measurements Using the micrometer, determine the thickness of the specimen. Unless otherwise specified, specimens that are sheets or panels shall be measured at least 25.4 mm [1.0 in] from the edge at all four (4) corners.

5.3 Evaluation

5.3.1 Data Recording For purposes including qualification or referee testing, product evaluation, statistical analysis, etc., each thickness measurement shall be recorded, unless otherwise specified.

5.3.2 Compliance to Specification

5.3.2.1 Unclad laminates or metallic clad laminates with overall nominal thickness Measurements taken after specimen preparation per 5.1.2 shall be compared with the applicable specification for compliance to the required tolerances.

5.3.2.2 Metallic Clad Laminates with Base Nominal Thickness

5.3.2.2.1 Compliance to Specification Using Method A Specimen Preparation Measurements taken after specimen preparation per 5.1.1 shall be compared with the applicable specification for compliance to the required tolerances.

5.3.2.2.2 Compliance to Specification Using Method B Specimen Preparation

5.3.2.2.2.1 Calculate the overall nominal thickness by adding to the base nominal thickness the total thickness of the metallic cladding. Thickness of metallic cladding shall be based on .035 mm [0.0014 in] per 45.7 g [1.0 oz], or as supplied by the foil supplier.

5.3.2.2.2.2 Calculate the minimum and maximum limits by subtracting and adding the required tolerance from the overall nominal thickness.

5.3.2.2.2.3 Measurements taken after specimen preparation per 5.1.2 shall be compared with the minimum and maximum limits as determined in 5.3.2.2.2.

5.4 Report Unless otherwise specified, report the average, minimum and maximum readings, and compliance with requirements, if applicable.

6.0 *Notes*

6.1 Use of hand or manual micrometers should be carefully administered. Pressure, anvil shape, and other features of the micrometer and its use must follow accepted industry practices, if not defined in the applicable specification.