1 Scope  This method covers the determination of the force required to initiate tearing in flexible insulating materials. It is based on ASTM D1004.

2 Applicable Documents

ASTM D374  Standard Test Methods for Thickness of Solid Electrical Insulation

ASTM D1004  Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting

3 Test Specimens

3.1 The specimens shall be prepared using flexible dielectric material. If the flexible dielectric is clad, the copper foil shall be etched using standard commercial practices.

3.2 Ten specimens, five in the transverse and five in the longitudinal (machine) directions, shall be cut from the sample material.

3.3 The test specimens shall conform to the dimensions shown in Figure 1.

4 Test Equipment

4.1 Testing Machines  A power driven machine of either of the two following types shall be used.

4.1.1 Static Weighing  Constant rate of grip separation type, negligible movement of the upper jaw.

4.1.2 Pendulum Weighing  Constant rate of grip motion type, constant rate of lower jaw movement, variable upper jaw movement. Either maximum load indicating devices or recorders are permissible in the testing machine. The applied load, as indicated by a recorder, dial or scale, shall be accurate to within 12 percent. If an indicating device is used, the indicator shall remain at the point of maximum load after rupture of the test specimen.

4.2 Grips  A gripping system that minimizes both slippage and uneven stress distribution on the specimen shall be used.

4.3 Thickness Measuring Devices  Suitable calibrated ratchet/friction thimble machinist’s micrometer reading to 0.0025 mm [0.0001 in] or less shall be used for measuring the thickness of the specimens. The micrometer shall conform to ASTM D374.

4.4 Die  A die having the dimensions shown in Figure 1 shall be used to cut all specimens. The 90° angle shall be honed sharp with no radius or have a minimum practical radius, as per ASTM D1004. The cutting edge of the die shall have a 5° negative rake, and shall be kept sharp and free from nicks to avoid leaving ragged edges on the specimen. Cutting may be facilitated by wetting the surface of the sample and cutting edges of the die with water. The sample shall rest on a smooth, slightly yielding surface that will not injure the die blade. Lightweight cardboard or a piece of leather belting is suitable. Care should be taken that the cut edges of the specimen are perpendicular to its other surfaces and that the edges have a minimum of concavity. NOTE: The test specimens results depend on the quality of the die used.

Figure 1  Die for Tear Test Specimen

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5 Conditioning

5.1 Conditioning The test specimens shall be conditioned at 23 °C ± 2 °C (73.4 °F ± 3.6 °F) and 50% ± 5% relative humidity for not less than 24 hours prior to test.

5.2 Test Conditions Conduct tests in the Standard Laboratory Atmosphere of 23 °C ± 2 °C (73.4 °F ± 3.6 °F) and 50 ± 10 percent relative humidity.

6 Speed of Testing A jaw separation of 25.4 mm [1 in] shall be used. The rate of travel of the power activated grip shall be 51 mm [2 in]/minute and shall be uniform at all times.

7 Procedure

7.1 Measure the thickness of the specimen at several points to the accuracy limits of the measuring devices specified in 4.3. Record the average thickness in millimeters or microns [in].

7.2 Place the specimen in the grips of the testing machine so that the long axes of the enlarged ends of the specimen are in line with the points of attachment of the grips to the machine.

7.3 Apply the load at 51 mm [2 in]/minute rate of grip separation. After complete rupture of the specimen, the maximum tearing load in grams [ounces] shall be noted from the dial scale or recorder chart and recorded. Data from specimens which break at some obvious flaw or which break in or at the edges of the grips shall be discarded and retests made.

8 Calculation The average resistance to tearing shall be calculated from five specimens tested in each principal direction of orientation. Data shall be recorded as grams [ounces] of tearing resistance.

9 Report

9.1 Report the average thickness of all specimens.

9.2 Report the average transverse and the average longitudinal initiation tear strength values.