

SEMI G75.9-0698 (Reapproved 0615) TEST METHOD FOR MEASUREMENT OF TENSILE STRENGTH, ELONGATION, AND TENSILE MODULUS OF LEADFRAME TAPE

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1 Purpose

1.1 Tensile strength, elongation, and tensile modulus of leadframe tape are measured by a tensile pull tester, which is used to stretch the tape samples to the point of breakage with a calibrated load cell.

2 Equipment

2.1 Tensile pull tester with 100 kg MAX load cell, sample clamping chucks, and a chart recorder.

2.2 Micrometer with 0.001 mm accuracy.

2.3 Calipers with 0.02 mm accuracy.

3 Test Condition

3.1 Tensile test measurements shall be carried out at the following ambient conditions:

3.1.1 *Temperature* — $23 \pm 5^\circ\text{C}$.

3.1.2 *Humidity* — $50 \pm 5\% \text{ RH}$.

4 Sampling

4.1 The sampling is one sample per one lot. The vendor has to report the definition of lot, if the customer requires it.

4.2 The sample width shall be $15 \pm 0.2 \text{ mm}$, and the length must be 100 mm minimum.

5 Equipment Setup and Calibration

5.1 Refer to the tensile tester manufacturer's equipment manual for setup and calibration.

5.2 The pulling rate shall be set to $5 \pm 0.5 \text{ mm/minute}$.

5.3 The load shall be recorded in kilograms.

6 Procedure

6.1 Measure the thickness (T) of the sample with the micrometer and the width (W) with calipers (mm).

6.2 Clamp the tape in the chucks so that the distance (L_0) between the chucks is $50 \pm 5 \text{ mm}$.

NOTE 1: Some equipment may measure this length automatically or plot Stress versus Strain, (L/L_0), directly, where L is the elongation.

6.3 Start the pulling and record until the sample breaks.

6.4 Repeat the testing procedures for all the samples.

7 Results

7.1 Read the Break Force A (kg) and Elongation L_1 (mm) at sample breakage from the chart.

7.2 Draw a tangent line from the origin of the Load-Elongation curve to the maximum slope of the curve (see Figure 1).

NOTE 2: B (kg) is the incremental force change required to produce an elongation, L_2 , in the elastic region and may be determined from the tangent line.

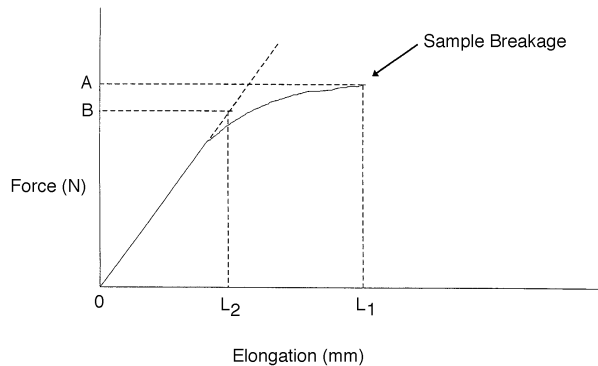


Figure 1
Breakage Point Calculation Diagram

7.3 *Calculations* — Tensile Strength at Break (s) is determined from the following equation:

$$S \text{ (N / mm}^2\text{)} = \frac{9.8 A}{WT} \quad (1)$$

7.3.1 Percentage Elongation at Break (e) is determined from the following equation:

$$\varepsilon(\%) = \frac{100 L_1}{L_0} \quad (2)$$

7.3.2 Tensile Modulus (E) is determined from the following equation:

$$E \text{ (N / mm}^2\text{)} = \frac{\Delta \text{Stress}}{\Delta \text{Strain}} = \frac{9.8 B / WT}{L_2 / L_0} \quad (3)$$

8 Related Documents

8.1 *ASTM Standards*¹

ASTM D638 — Standard Test Method for Tensile Properties of Plastics

8.2 *JIS Standards*²

JIS K 6911 — Testing Methods for Thermosetting Plastics

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² Japanese Standards Association, 4-1-24 Akasaka, Minato-ku, Tokyo 107-8440, Japan; Telephone: +81.3.3583.8005, Fax: +81.3.3586.2014, <http://www.jsa.or.jp>