

SEMI D74-0116

GUIDE FOR MEASURING DIMENSIONS OF PLASTIC FILMS/SUBSTRATES

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1 Purpose

1.1 Plastic films/substrates for flexible displays change their dimensions by temperature and humidity. Also their dimensions will change by time after heat treatment, water treatment, etc. This Document provides procedures for the measurement environmental condition to measure dimensions of plastic films/substrates.

2 Scope

2.1 This Standard provides guidance for measuring dimensions of plastic films/substrates for electronic devices.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 This Standard applies to plastic films/substrates for flexible displays.

4 Referenced Standards and Documents

4.1 SEMI Standards and Safety Guidelines

SEMI D66 — Terminology for Plastic Substrates for Flexible Display

4.2 ISO Standard¹

ISO 291 — Plastics Standard Atmosphere Conditioning and Testing

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Terminology

5.1 Definitions

5.1.1 *machine direction (MD)* — of plastic films/sheets. Parallel to plastic films/sheets forming direction.

5.1.2 *transverse direction (TD)* — of plastic films/sheets. Perpendicular to plastic films/sheets forming direction.

6 Application Specific Section

6.1 Dimension Measurement

6.1.1 *Measurement* — It is recommended to create at least two markers on the plastic films/substrates by pen, laser, etc. The distance between the two markers is recommended to be 100 mm or longer. The distance between two markers shall be measured with a measuring machine.

6.1.1.1 When measuring a curled or twisted sample, the sample shall be held or fixed. For example, place a transparent glass substrate on the sample, vacuum contact (make sure that the vacuum holes are not at the measuring area), etc.

6.1.2 *Sample Size* — At least one side of the rectangle shape having a length of more than 100 mm is recommended for dimension measurement and it should be larger/longer than the measurement distance. The following points shall be noted in the report;

¹ International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland; Telephone: 41.22.749.01.11, Fax: 41.22.733.34.30, <http://www.iso.org>

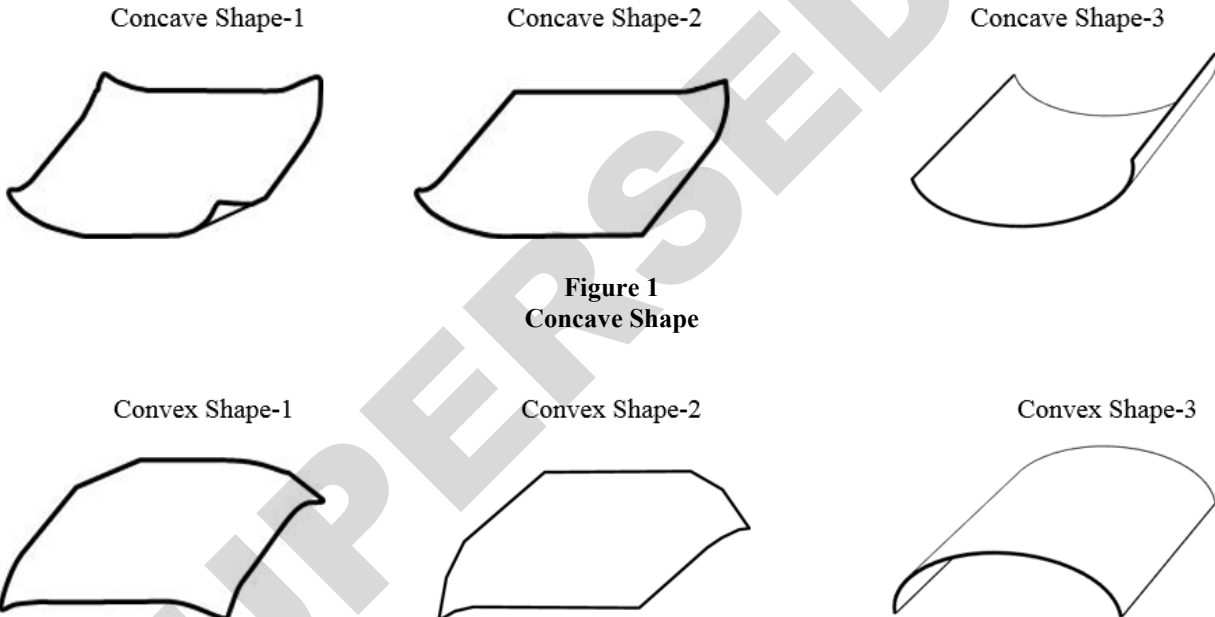
- Sample size, sample thickness and measured distance.
- Measured direction. Such as MD/TD in case of plastic films.

6.1.3 *Measurement Condition* — $23 \pm 1^\circ\text{C}$, $50 \pm 5\%$ RH is recommend for measuring the dimension [ISO 291]. After any heat treatment, before measuring the dimension, the heat treated sample shall be cooled down for at least 12 hours (24 hours or more is better) at the same atmosphere condition as the measurement condition. After water treatment and drying, before measuring the dimension, keep the treated sample for at least for 12 hours (24 hours or more is better) at the same atmosphere condition as the measurement condition. Time depends on polymer material or the construction of plastic substrate/film. For example, double side barrier film, etc.

6.1.4 *Sampling Position/Frequency* — There is a possibility that the dimension might be different from which area sample came from. From this point, it is recommended to measure a couple or more samples in width or length direction, and note where the samples came from.

6.2 *Curl/Twist Measurement*

6.2.1 *Measurement* — Measure the height of each corner from the surface and note. The shape of the measured sample shall be noted. Also note the shape of the sample when it is not possible to measure the height. The height of each corner can be measured with a ruler, dial gauge, laser, etc.



#1 Turn the sample upside down for measurement.

Figure 2
Convex Shape