

# SEMI P34-0200 (Reapproved 0707) SPECIFICATION FOR 230 mm SQUARE PHOTOMASK SUBSTRATES

This standard was technically approved by the global Micropatterning Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on April 25, 2007. It was available at [www.semi.org](http://www.semi.org) in June 2007. Originally published February 2000.

**NOTICE:** This Standard or Safety Guideline has an Inactive Status because the conditions to maintain Current Status have not been met. Inactive Standards or Safety Guidelines are available from SEMI and continue to be valid for use.

## 1 Purpose

1.1 To define the standard requirements for nominally square photomask substrates of 230 mm nominal edge length.

## 2 Scope

2.1 This specification covers information pertaining to substrates for 230 mm square photomasks. This information includes, but is not limited to, physical dimensions, material properties, and testing and measurement criteria.

**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 Referenced Standards and Documents

### 3.1 ANSI Standard<sup>1</sup>

ANSI/ASQ Z1.4 — Sampling Procedures and Tables for Inspection by Attributes

### 3.2 ASTM Standard<sup>2</sup>

ASTM E228 — Standard Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer

### 3.3 ISO Standard<sup>3</sup>

ISO 14644-1 — Cleanrooms and Associated Controlled Environments

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

## 4 Terminology

### 4.1 Definitions

4.1.1 *230 mm* — the nominal edge length for the reticle generation defined in this specification. Also referred to as “9 inch” size.

4.1.2 *corner chamfer* — the bevel found in one corner of the substrate, in excess of the edge chamfer, as defined in ¶ 9.3 and Figure 6.

4.1.3 *critical side* — major side intended for patterning. The critical side has no chamfered corner(s) (see ¶ 9.3), and has flatness requirement equal or better than the non-critical side (see ¶ 8.1).

4.1.4 *edge chamfer* — the bevel found on all intersections between major and minor sides, as defined in ¶ 6.2 and Figure 3.

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<sup>2</sup> American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959, USA. Telephone: 610.832.9585; Fax: 610.832.9555; <http://www.astm.org>

<sup>3</sup> International Organization for Standardization, ISO Central Secretariat, 1 rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland. Telephone: 41.22.749.01.11; Fax: 41.22.733.34.30; <http://www.iso.ch>

4.1.5 *non-critical side* — major side not intended for patterning. Any and all chamfered corners are on the non-critical side (see ¶ 9.3 and Figures 5 and 6).

## 5 Ordering Information

5.1 Purchase orders for photomask substrates furnished to this specification shall include the following:

5.1.1 Nominal edge length, nominal thickness, edge criteria including straightness and squareness, and parallelism of major sides (see § 6); straightness shall be measured on all four minor sides;

5.1.2 Material (see § 7);

5.1.3 Flatness quality area and flatness Total Indicated Reading (T.I.R.; see § 8);

5.1.4 Visual quality area and defect limits (see § 9); and

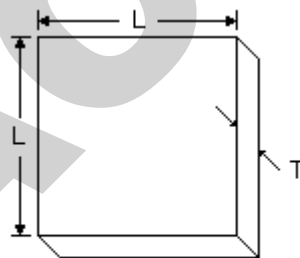
5.1.5 Lot acceptance criteria (see § 10).

## 6 Dimensions and Permissible Variations

6.1 The substrates shall conform to the dimensional tolerances appropriate to the nominal edge length and thickness as listed in Table 1. Dimensions are illustrated in Figure 1 and a fixture for measuring the squareness dimensions is shown in Figure 2.

**Table 1 Specifications for Edge Length, Squareness, Straightness, and Thickness for Square Substrates**

| <i>Nominal Edge Length</i> | <i>Edge Length Minimum</i> | <i>Edge Length Maximum</i> | <i>Squareness</i> | <i>Straightness (T.I.R.)</i> | <i>Thickness Minimum</i> | <i>Thickness Maximum</i> | <i>Units</i> |
|----------------------------|----------------------------|----------------------------|-------------------|------------------------------|--------------------------|--------------------------|--------------|
| 230 mm (virgin)            | 229.6                      | 230.0                      | 0.186/213         | 0.050                        | 8.90                     | 9.10                     | mm           |
| 230 mm (repolished)        | 229.6                      | 230.0                      | 0.186/213         | 0.050                        | 8.80                     | 9.10                     | mm           |



L = Edge Length  
T = Thickness

**Figure 1**  
**Square Photomask Substrate**

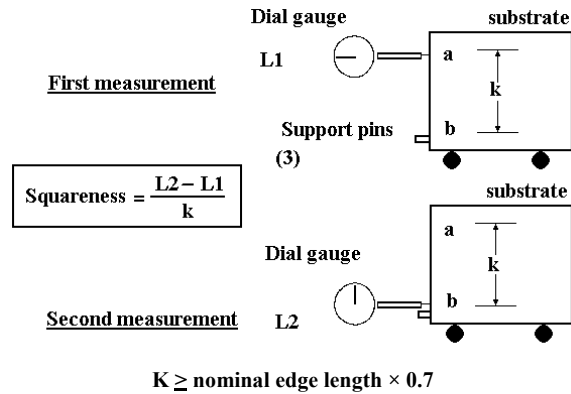
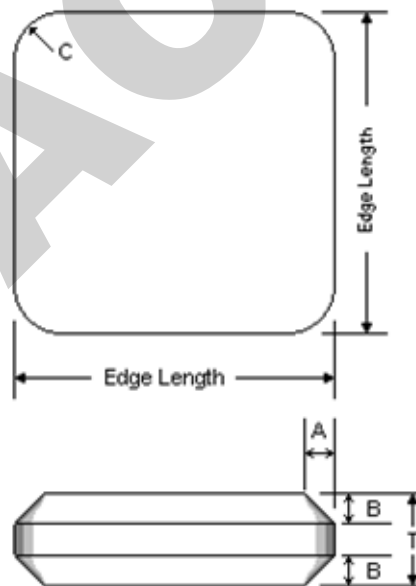


**Figure 2**  
**Measurement Fixture and Calculation to Determine Substrate Squareness**

6.2 Substrates shall have chamfered edges between major and minor sides, and rounded corners between minor sides. The edges shall conform to the dimensional tolerances appropriate to the nominal thickness listed in Table 2. Dimensions are illustrated in Figure 3.

**Table 2 Specifications for Chamfered Edge Dimensions**

| T       | A    | A    | B    | B    | C    | C    |       |
|---------|------|------|------|------|------|------|-------|
| Nominal | Min. | Max. | Min. | Max. | Min. | Max. | Units |
| 9.00    | 0.20 | 0.60 | 0.20 | 0.60 | 2.00 | 3.00 | mm    |



Note: "C" is radius of curvature of corners.

**Figure 3**  
**Dimensions for Chamfered Edge and Rounded Corners**