

SEMI P3-0308

SPECIFICATION FOR PHOTORESIST/E-BEAM RESIST FOR HARD SURFACE PHOTOPLATES

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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.

NOTICE: This Document was completely rewritten in 2008.

1 Purpose

1.1 This Specification covers the general requirements on the photoresist and e-beam resist coating for hard surface photoplates. See SEMI P1 and SEMI P2 for requirements on physical characteristics of the photoplate substrate and the chrome coating on it.

2 Referenced Standards and Documents

2.1 SEMI Standards and Safety Guidelines

SEMI P1 — Specification for Hard Surface Photomask Substrates

SEMI P2 — Specification for Chrome Thin Films for Hard Surface Photomasks

2.2 ANSI/ASQ Standard¹

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

2.3 ASTM Standard²

ASTM E122 — Recommended Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process

2.4 ISO Standard³

ISO 14644-1 — Cleanrooms and Associated Controlled Environments Part 1: Classification of Air Cleanliness

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

3 Terminology

3.1 Definitions

3.1.1 *comets* — buildup of resist in the form of a comet, generated by a defect.

3.1.2 *defects, photomask* — any flaw or imperfection in the opaque coating or functional pattern of a photomask that will reproduce itself in a photoresist film to such a degree that it is pernicious to the proper functioning of the microelectric device being fabricated.

3.1.3 *fingerprint* — residual surface contamination deposited during handling.

3.1.4 *photoresist lifting* — the loss of adhesion of a photoresist coating to its substrate.

3.1.5 *pinhole* — a small opening extending through a cover as a photoresist coating or an oxide layer.

3.1.6 *residue* — any undesirable material remaining on a substrate after any process step.

¹ American National Standards Institute, 25 West 43rd Street, New York, NY 10036, USA; Telephone: 212.642.4900, Fax: 212.398.0023, <http://www.ansi.org>

² ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA; Telephone: 610.832.9585, Fax: 610.832.9555, <http://www.astm.org>

³ 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>

3.1.7 *resist rings* — buildup of resist in round, multicolored rings, generated by particles or bubble bursts.

3.1.8 *striation* — radial, colored, thin lines starting in the center of the plate and extending out.

4 Ordering Information

4.1 Purchase orders for resist-coating for hard surface photoplate substrates furnished to this Specification shall include the following in addition to the information called for in SEMI P1 and SEMI P2:

4.1.1 Resist Material

4.1.2 Resist Thickness and Tolerance in the Quality Area

4.1.3 Resist Uniformity across the Visual Quality Area

4.1.4 *Resist Consistency* — From Plate to Plate

4.1.5 Defects

5 Visual Criteria

5.1 *Visual Quality Area*

5.1.1 *Circular Visual Quality Area* — See SEMI P1, Figure 6, for Available Flatness Limits of Hard Surface Photomask Substrates.

5.1.2 *Square Visual Quality Area* — See SEMI P1, Figure 7, for Available Flatness Limits of Hard Surface Photomask Substrates.

6 Defects

6.1 Specific defects of photoresist/E-beam resist are pinhole, striation defects etc.

6.2 Specification of glass substrate defect shall be agreed upon by the supplier and user.

6.3 Typical value for the defect specification would be zero defects equal to or greater than 1 μm , 2 μm , 3 μm , 5 μm , or 10 μm in size.

7 Sampling

7.1 Unless otherwise specified, appropriate sample sizes shall be selected from each lot in accordance with ANSI/ASQ Z1.4. Each quality characteristic shall be assigned an acceptable quality level (AQL) in accordance with ANSI/ASQ Z1.4 definitions for critical, major, and minor classifications. If desired, and so specified in the contract or order, each of these classifications may alternatively be assigned cumulative AQL values. Inspection levels shall be agreed upon between user and supplier.

8 Handling

8.1 Resist-coated substrates are to be handled on the edges only.

9 Certification

9.1 Upon request of the purchaser in the contract or order, a manufacturer's or supplier's certification that the material was manufactured and tested in accordance with this specification shall be provided.

10 Packaging and Marking

10.1 Resist-coated substrates shall be packed in a clean room environment as defined by ISO 14644-1. Specification of Classification of Air Cleanliness should be agreed upon by the supplier and user. Shipping containers should be agreed upon by the supplier and user. Packaging shall comply with the applicable international, national, state, and local laws and regulations required for shipping.

10.2 Each shipment shall be identified by user purchase order number, drawing number (if applicable), quantity, supplier lot number, material identification, film thickness, resist type, resist lot number, and date of applying resist.