Semiconductor Equipment and Materials International

Proposed changes to P-37

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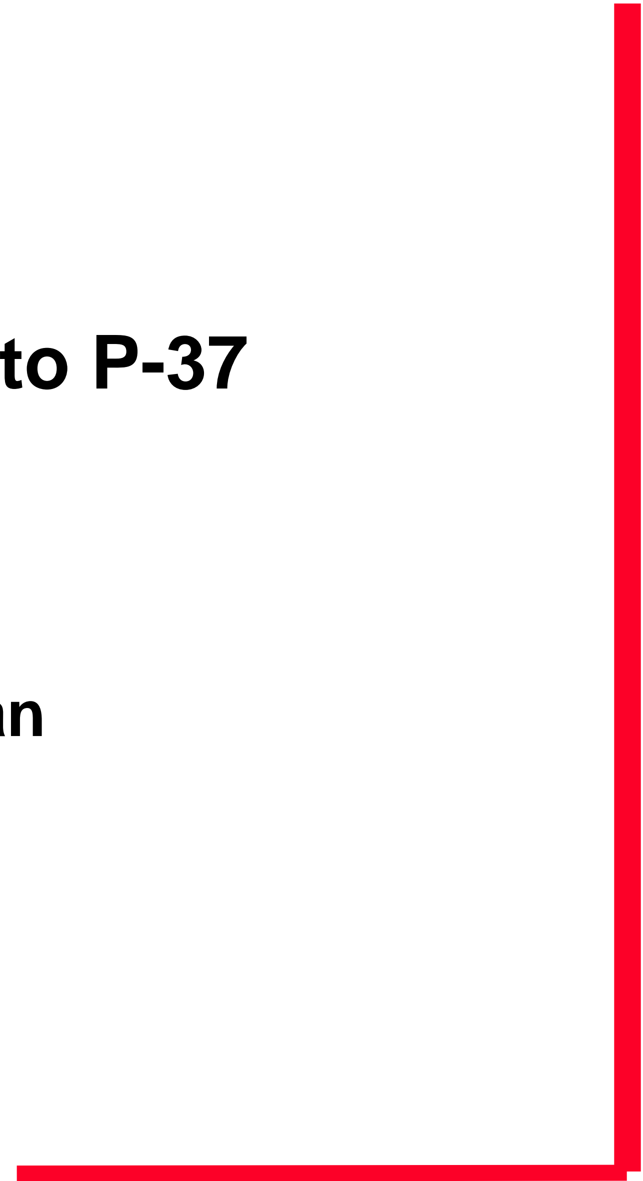

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Summary of suggested changes to P-37

- Add a section on how to measure total reflectivity uniformity
- Update Notes in related information
- Update tables in related information
  - OR
    Remove related information if covered in ITRS

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The Notice and Note 1 contradict each other

NOTICE: This related information is not an official part of SEMI P37 and was derived from the work of the global Micropatterning Committee. This related information was approved for publication by full letter ballot procedures on September 4, 2009.

NOTE 1: This related information was approved as an official part of SEMI P37. However, the recommendations in this related information are optional and not required to conform to this standard. The purpose of this related information is to convey additional ordering information that could be useful to purchasers. These recommendations are applicable to the 2010–2012 timeframe.

- **The related information is an official part of SEMI P-37**

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Table R1-1 requires changes to accommodate focus

Table R1-1 Suggested Substrate Flatness and Blank Bow Specifications for 2010–2012 Time Frame

Item	*No Mask Pattern Compensation for non-flatness*	*With use of Mask Pattern Compensation for non-flatness*	*Units*
Frontside Flatness and Backside Flatness with wedge and bow removed Within Flatness Quality Area	30 peak-to-valley	300 peak-to-valley	nm
Total Freestanding Blank Bow Over Flatness Quality Area	≤600 peak-to-valley	≤1500 peak-to-valley	nm

- **A 300nm peak-to-valley non-flatness will use about 20nm of the litho tool focus budget**

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Table R1-3 minimum median reflectivity should reflect what is required

Table R1-3 Recommended Multilayer Stack EUV Reflectivity

Class	*Median Reflectivity λ_m : minimum value at center of plate*	*Median Reflectivity λ_m : maximum uniformity range across quality area*	*Median reflected wavelength range across quality area*
All masks	≥62%	≤0.2% total range	0.04 nm

- **≥ 62% is too low a value and does not reflect what is currently being made, planned or required**

Total reflectivity uniformity

- **Define total reflectivity uniformity (TRU) in P-37**
- **Modify section 5.2.4 and 5.2.5 to include TRU as an optional way to specify the wavelength variation and the uniformity of reflectance**

5.2.4 The allowed deviation of the measured median reflected EUV wavelength at the center of the mask from the incident median wavelength (to be defined by users and material suppliers) of the multilayer film stack, and the range of variation of the median reflected wavelength across the multilayer film stack (see ¶ 7.2, Figure 7 and Table R1-3);

5.2.5 The minimum value for the median EUV reflectance of the multilayer film stack and the uniformity of the reflectance across the quality area (see ¶ 7.2 and Table R1-3);

TRU is determined by comparing the system transmission for all points on the reticle

- The system transmission is calculated by multiplying all the reflectivity curves of the PO mirrors and mask
- For a L-mirror system, calculate the effective transmission T for each point on the reticle by taking the sum of the product of the PO mirrors and reticle
- Transmission

$$T_n = \sum M_1(\lambda) * M_2(\lambda) * M_3(\lambda) * M_4(\lambda) * \ldots * M_L(\lambda) * R_n(\lambda)$$

$$T_n = \sum M^6(\lambda) * R_n(\lambda)$$

- The transmission for each point is compared to each other