

SEMI P37 Status SPECIFICATION FOR EXTREME ULTRAVIOLET LITHOGRAPHY SUBSTRATES AND BLANKS

Co-authors:

David Chan (SEMATECH)

Kevin Orvek (SEMATECH)

John Zimmerman (ASML)

Tsuneyuki Hagiwara (Nikon)

Akira Miyake (Canon)

Kazuya Ota (Selete)

Yoshiaki Ikuta (AGC)

Tsutomu Shoki (HOYA)

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P-37 has been approved by SEMI



Submitted Responses For SEMI Draft Document 4585

As Cast Ballot Tally Summary For Document 4585

Return Percentage: 60.34%

Voting Member Returns: 35

Voting Member Distribution: 58

Total votes Received: 36 Number of Abstains: 16

Number of Accepts: 18

Accept %: 90.00%

Total Comments: 4

Comment Issuer(s):

ITSdI - Rafael Vargas-Bernal

KSC - Karl Sommer

Intel - Long He

IMEC - Rik Jonckheere

Number of Rejects: 2

Total Rejects: 2

Reject Issuer(s):

Toshiba - Iwao Higashikawa

Nikon - hagiwara_t

There were 3 issues in the 2 rejects



- One reject issue was a statement in the main body
 - ITRS was referenced in the document
 - The committee decided that the deletion of the sentence was not a technical change. Sentence was removed.
- The other 2 reject issues were concerns in the Related Information section (Appendix) which is not required for compliance
 - Image placement compensation strategy is new technology to this standard thus it necessitates related patent survey and disposition as required SEMI's regulation. Patent disposition has not been done sufficiently.
 - There are two methods described. One of the methods requires no new technology, and users are not locked to any method. Committee overruled rejection.
 - Image compensation strategy is not mature technology and current recommended flatness value for use with image placement compensation does not seem to guarantee acceptable performance.
 - The committee agreed that 2 sentences could be added to the section

Revised section on flatness recommendations in the Related Information Section



 R1-1.2.1 There are two possible strategies that could be used when specifying flatness requirements for mask substrates and the final bow requirement on the blanks; one using relaxed requirements if the mask pattern generator shall make use of a flatness compensation scheme to adjust image placement due to substrate non-flatness and blank bow, and the other with tight specifications on substrate flatness and blank bow if no correction of image placement (for non-flatness) is possible at the mask pattern generation step. Table R1-1 provides recommended values for flatness and bow under these two possible strategies. It is important to note that image compensation strategy is not a mature technology. Current recommended flatness values for use with image placement compensation may not guarantee acceptable performance. The recommended quality area is 142mm x 142mm maximum.

Considerations for future changes to P-37



- Implementing flatness compensation in production requires that the blank flatness metrology be precisely defined to allow easy use in mask shops:
 - Reference coordinates (x, y and z) and orientation
 - Measurement area
 - Filtering
 - Minimum sampling schemes
- Flatness Definition
 - Local slope
 - Bow (also whether to include in flatness or not)
- Multilayer reflectivity uniformity definition
- Mask substrate thermal material properties (CTE?)
- Remove performance recommendations in related information section and incorporate them into the ITRS
 - Bow
 - Local slope



Backup



SEMI P40 Status SPECIFICATION FOR MOUNTING REQUIREMENTS FOR EXTREME ULTRAVIOLET LITHOGRAPHY MASKS

EUV Mask TF Co-chairs:

Tsuneyuki Hagiwara (Nikon)

George Huang (UMC assignee SEMATECH)

Akira Miyake (Canon)

Kazuya Ota (Selete)

John Zimmerman (ASML)

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The revisions for P-40 have been approved by SEMI



Submitted Responses For SEMI Draft Document 4584B

As Cast Ballot Tally Summary For

Document 4584B

Return Percentage: 60.00%

Voting Member Returns: 33

Voting Member Distribution: 55

Number of Rejects: 0

Total votes Received: 41 Number of Abstains: 21

Number of Accepts: 20

Accept %: 100.00%

Total Comments: 1 Total Rejects: 0

Comment Issuer(s): Reject Issuer(s):

NIST - James Potzick

Considerations for future changes to P-40



- In order for flatness compensation to work, tighter chuck flatness requirements are needed for tool generations beyond 2012
 - Current specification of 30nm non-flatness could contribute up to 0.75nm image placement error at wafer
 - SEMI EUV Mask Task Force must begin work on future chuck requirements.



Future considerations for P40, P37 and E152

- P37 SPECIFICATION FOR EXTREME ULTRAVIOLET LITHOGRAPHY SUBSTRATES AND BLANKS
- P40 SPECIFICATION FOR MOUNTING REQUIREMENTS FOR EXTREME ULTRAVIOLET LITHOGRAPHY MASKS
- E152 MECHANICAL SPECIFICATION OF EUV POD FOR 150mm EUVL RETICLES



There are 2 types of EUV inner pods whose differences are described in SEMI E152

Feature	Specification	
	Type A	Type B
Reticle Location Tolerance	± 0.55 mm	± 0.25 mm
Reticle Location Tolerance	± 0.55 mm	± 0.25 mm
Front Edge Grip Exclusion Volumes	Required	Not Required
Baseplate Apertures	Required	Not Required
Baseplate Corner Notch	$72.00 \pm 0.20 \text{ mm}$	Prohibited
Baseplate Corner Notch	$3.00 \pm 0.25 \text{ mm}$	Prohibited
Secondary Baseplate Exclusion Volume	$3.00 \pm 0.25 \text{ mm}$	Prohibited
Secondary Baseplate Exclusion Volume	$6.00 \pm 0.25 \text{ mm}$	Prohibited
Baseplate Notch	$3.00 \pm 0.25 \text{ mm}$	Prohibited
Cover Edge Limit (above base plate, along x22)	5.00 mm, Minimum	Prohibited
Baseplate Exclusion Volume	$50.00 \pm 0.25 \text{ mm}$	$40.00 \pm 0.25 \text{ mm}$
Baseplate Exclusion Volume	$25.00 \pm 0.25 \text{ mm}$	$20.00 \pm 0.25 \text{ mm}$
Baseplate Registration Hole Assignments	A, B, C, D, E, F	A, B, C

Type A inner pods specifically address the needs of EUV-pods needed by lithography tools

The feature differences in this table prevent Type B pods from being used where Type A pods are needed. Type A pods can be used in place of Type B pods.

All the differences are limited to the baseplate.

Recommendations for Near Term Standard Improvements on E152 (Carriers)



- Eliminate the needs for further Type-A carrier dedication if possible among exposure tool venders, and/or different tool sets from a single vender.
 - Share the same window glass/optical property, by adopting similar wavelengths to read and align EUVL mask.
- Eliminate the two extensions of Type A baseplate, which is defined by y38 and x22, etc...
 - Pave the way to eliminate Type A, B dedication in the future.
- But, for now leave the general Type A and Type B alone, until demonstrating at least one of the two types meets 16nm hp requirements.
 - Unlikely to have the needed inspection capability in two years