



EUV Mask Standards update

SEMI P37



- Will combine old P37 (Substrates), P38 (Blanks, Masks)
- Targets timeframe of 2010-2012
- Sets standards for all LTEM substrates
- Sets standards for Blanks/Masks only if destined for Pilot Line Yield use
 - Not required for the multitude of tool and process development masks.
 - Purchase Orders for other blanks/masks could refer to the standards.
- Does not replace Purchase Order specifications
 - Many specifications in Standard represent an upper limit, and Users may/will want tighter specifications.
 - We are unable to move to common substrates/blanks for all scanner suppliers in this timeframe. There will have to be PO specified items to aim substrates/blanks to the specific scanner tool.
- Target is now Yellow Ballot submission January 5, 2009
 - Voting Jan 19 – Feb 18.
 - If we work hard, good ballot can be adopted at Feb 27, 2009 SEMI Microlithography Committee meeting.

DRAFT SEMI P37



- Removes a ton of unspecified 'specifications' from old standards, as well as some of the real specifications.
 - Items best specified by PO, given the variability of User chip sizes/fields, Scanner type, material uniqueness, and metrology tools to be used.
- Defect quality areas, and number/size of defects, is not covered. Instead the reader is urged to consult the latest ITRS roadmap for these items. Since the industry is working on defect-compensation schemes the Buyers may have different requirements.
- A major addition is an option to use relaxed substrate/blank non-flatness specifications if using e-beam writer image placement compensation for the mask non-flatness.
 - Although not proven out completely yet, many organizations are now involved in the development and testing.
 - Future requirements on mask non-flatness may be a showstopper without e-beam compensation.

SEMI P40



- Old P40 covered mounting requirements for many tools that handle EUV masks
 - Specified clamping the mask to a flat reference surface, and applied to Scanner, E-beam writer, and mask Image Placement (IP) metrology tool.
 - But mask writers and IP metrology tools use 3 point mounts.
- New P40 will only apply to Scanner.
 - Flatness of scanner chuck surface is tightened to 30nm from 48nm
 - Key requirement to enable mask non-flatness compensation schemes in which we must be able to neglect the chuck surface non-flatness in the modeling.
 - Basically Scanner suppliers want a version of P40 to remain in effect until we prove mask non-flatness compensation schemes work.
- Revised P40 could go to Yellow Ballot on same cycle as P37, with potential adoption by Feb 27, 2009.

SEMI standard for Fiducials



- Mask non-flatness, and Defects, are the two Critical specification issues for substrates and blanks.
 - New P37/P40 with e-beam compensation addresses mask non-flatness
 - A new standard is being created to enable methods of compensating for some small level of defects.
- Putting fiducial marks down into the LTEM/capping layer would allow accurate defect location maps to be used to 'bury' or cover a few ML defects with absorber features during mask patterning.
- Many details to be worked on yet – fiducial creation tools, grid accuracies, fiducial design for e-beam recognition, how much leeway do we have to 'move' defects under absorber patterns.
- Timeframe:
 - SPIE 2009: overall strategy defined, including mask design and concept demonstrations
 - Spring 2009: Draft Standard
 - Summer 2009: Yellow Ballot

SEMI standard for EUV Mask Carriers



- SEMI Draft Document 4466, New Standard: Mechanical Specification for a 150mm EUVL Reticle SMIF Pod (EUV POD)
 - 1st Ballot attempt in February 2008:
 - 17 accepts, 42 abstains, 3 comments, 5 rejects
 - 2nd Ballot attempt underway
 - Voting continues till October 8 (next week)
 - If successful North American Physical Interface and Standards Committee could adopt in November 2008.
- Standard encompasses two types of inner pods,
 - One intended for exposure tool use, includes windows for viewing product
 - The other does not have the windows
 - User selects which one according to their needs