AMAT Sem Vision G3 SEM

Equipment

- Configuration and Requirements: As per purchase order and AMAT configuration documents
- "System" as referred in this document includes all items listed in purchase order.
- General description:

a. Module: AMAT SEMVision ™ G3

b. Wafer size: 200mm notch

c. SMIF

1. Transport

Definition

Test of system handling

Method

200 wafers to perform entire transfer cycle.

Requirements

No failures, alarms, or human intervention, except for cassette loading; wafer breakage or scrap due to handling not to exceed more than one wafer per 7500 runs through the system.

Wafer breakage will be monitored over a period of 3 months after system/s installation/s

2. Breakage rate

Definition

System ability to run wafers without wafer breakage.

Method

Run wafers through the system in all allowed operation sequences. Wafer breakage event will be monitored during final acceptance period.

Requirements

During the final acceptance period, breakage wafer event will not occur.

3. Particle

Definition

"CP": Contaminating Particles, refer to number of particles >0.16 um added to 8" Bare- Si wafer as measured using calibrated SP1 TBI or equivalent.

Method

Four (4) bare wafers will be measured at SP1 TBI or equivalent at a sensitivity of 0.1µm. 2 wafers will stay at the SMIF POD, and 2 wafers will be cycled through the machine for 100 consecutive times each. For each wafer the following will be calculated:

$((CP_{after} - CP_{before})/100)$-SMIF-CP

SMIF-CP = $CP_{reference,after}$ - = $CP_{reference,before}$

Requirements

Particles of more than 0.16µm ≤ 1. CP/wafer.cycle

Capability

Inspection mode:

1) Automatic defect review
2) Manual defect review
3) Automatic bare wafer defect review:
4) Automatic defect classification on pattern wafer
5) Automatic EDX performance on bare wafer
6) Manual EDX on product wafer

4. Throughput

Definitions

The machines throughput in terms of wafers per hour.

Method Measured review time include load alignment inspection and unload for 5 wafers, 50 defect each. In case ADC option available on tool the throughput time is include ADC.

$$\text{\# Of wafers per hour} = \frac{\text{\# of reviewed wafers}}{\text{Total review time}} * 60$$

Requirements

Mode	# wafers per hour
Automatic review	13

5. Performances

Resolution

Definition

An ability to distinguish between two close objects.

The resolution will measure on AMAT resolution target.

Requirements

Tilt	Resolution
0º	4 nm @ 1kv
45º	8 nm @ 1kv

6. Defect redetection.

Method

- 5 TSL's wafers will be automatically reviewed.
- At least 50 defects on each wafer
- Wafer layers: poly-Etch and Metal-Etch.

$$\text{Redetection rate} = \frac{\text{\# of correctly detected defect}}{}$$

Total # of defects

Requirement

Redetection rate on all the wafers will be better than 85%.

7. Detection repeatability

Method

One TSL's wafer will review 10 consecutive times. The defects redetection rate will be tested. Minimum number of detected defect will be at least 50

Detect repeatability (%) = (actual value – Average value)

Total defect #

Requirements

Detection repeatability better than 90%

8. Detection focus

Method

The detected images will be reviewed by TSL's engineer to test focus quality.

Requirement

Number of properly focused images > 92% target 95%

9. Stage accuracy

Method:

The stage accuracy test will perform on TSL's wafer the test will perform 3 times at 0^{o},15^{o} and 45^{0} tilt. The distance Tilt Eccentricity-/+ 10µm Requirements

Coordinate difference between at FOV center and defect center will be less than 1.5µm Stage Accuracy -/+ 1.5µm

Comply with clarification: Comply with -/+ 1.5 um, measured according to AMAT ATP

10. Automatic defect classification

ADC sequence

- The SEMVISION will load KLA-Tencor 2xxx or AITx or all KLARF output file The SEMVISION will automatically align the wafer and move from defect to defect.
- At each site the SEMVISION will download TIFF image. And update the KLARF file with the ADC class code.

The SEMVISION will export the KLARF file with the related images to the YMS system Performance.

Definition

- Accuracy = (# of correctly classified defects by ADC / # of defects classified by user).
- Purity = (# of correctly classified defects by ADC / total # of defects classified by ADC).

Method

- Performance
- Over time (month or 20 lots)
- Layer definition: Poly-etch, M2- Etch
- Minimum # of defects for each class: 50 defects

Requirements

- 3-6 classes (on test set)
  - Overall Accuracy >80%
  - Overall, Purity >80%
  - Minimum Accuracy per class >75%
  - Minimum Purity per class >75%
- 3-6 classes over time. Process stability and tool optimal calibrations are prerequisite for the testing period.
  - Overall Accuracy >80%
  - Overall, Purity >80%
  - Minimum Accuracy per class >75%
  - Minimum Purity per class >75%
  - Minimum Accuracy per lot >70%
  - Minimum purity per lot >70%

11. 200mm integrated SMIF

One TSL wafer will run 10 consecutive times. The classification repeatability will be tested.

For each defect repeatability will be measured based on the first run

Defects class code will be written in the attached table

Defect #	Class base line	Run 1	Run n	Defect repeatability
1				
2				

Defect repeatability = # ADC classified defect as Standard class / # of runs

Requirement

ADC repeatability will be better than 85%.

12. EDX

The EDX system software will be accessible though the SEMVISION user interface and will be capable of storing and labeling EDX spectra.

Automatic bare wafer review option

- The SEMVISION will load Tencor 6xxx or SP1 output file.
- The SEMVISION will automatically aligning the wafer and moving from defect to defect.
- At each site the SEMVISION will download TIFF image.
- The SEMVISION will export the KLARF file with the related images to the YMS system.
- Defect redetection rate on bare wafer will be above 90%.
- In case EDX option is available. The SEMVISION will be able to perform automatic EDX on the detected defect and store the results.