TECHNICAL SPECIFICATIONS

FOR THE SUPPLY OF
A 'SCANNING ELECTRON MICROSCOPE'
FOR
SCUOLA SUPERIORE SANT'ANNA

ALLEGATO "A" – LOTTO 3
PROCEDURA APERTA IN LOTTI PER LA FORNITURA DI APPARECCHIATURE SCIENTIFICHE PER IL PROGETTO PIC

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INTRODUCTION

This technical specifications summarize the main requirements for a SEM that will be installed in the Clean Room of TeciP Institute. It is needed for inline wafer inspection and quality control.
Common measurements include critical dimension checks of the following structures:
Silicon or Photoresist gaps, in the range 75-90nm
Silicon 400nm wide lines
Silicon and Silicon oxide sidewall roughness

1. Technical specifications: minimum requirements

1.1 Configuration

- The system is set for 6'' Silicon wafer. It must, however, be able to scan and permit any stage movement to an entire 8'' (200mm) Silicon wafer surface.
  Fully motorized stage for accurate substrate movement:

  a. xy direction: resolution < 100nm
     positioning repeatability < +/-1um
  b. z-axis movement up to 100mm
  c. rotation capability 360°
  d. tilting range capability -30°/+90°

- Secondary electrons detector suitable for:

Resolution	Voltage
1,0 nm	30 kV
1,2 nm	15 kV
2,0 nm	3 kV
3,5 nm	1 kV

- Backscattered electrons detector in column up to 30kV
- Magnification from 10x to 1'000'000x
  Maximum field of view >55mm

- Accelerating voltage from 200V to 30kV
  Probe current from 2pA to 200nA
  Scanning speed from 20ns to 10ms per pixel

- IR CCD for chamber internal view

- Software for process parameters control.
- Software for image acquisition, post-processing and analysis.
  Image resolution up to > 16Mpx
- System for active isolation from environmental vibration, integrated in the chamber

- Capable of achieving: -chamber working vacuum: ≤ 9.0E-3 Pa
  -gun vacuum (isolated by UHV automatic valve): ≤ 3.0E-7 Pa
  -chamber pumpdown time: ≤ 3 min

1.2 Conditions

- Conformity to CE standard and certification
- Availability of spare parts guaranteed for minimum 10 years
- Warranty 1 year
- Shipment and installation included to:
  Scuola Superiore Sant'Anna (TeciP Institute)
  Via Giuseppe Moruzzi 1
  56127 Pisa (Italy)

2. Technical specifications: evaluable features

2.1 Configuration

- Lower magnification capability. In continuous starting from 1x to 1'000'000x
- Modem for remote software support
- Higher number of available ports on chamber for future upgrades
- Automatic functions for optimization of the beam via software. Continual spot size, beam current and scanning speed optimization, gun and column centering, vacuum control.
- Resolution at low voltages
- Resolution improvement at high voltages

2.2 Condition

- Consumable spare parts kit for yearly ordinary maintenance
- One extra year warranty

3. Installation, acceptance, documents, training

3.1 Installation

Scuola Superiore Sant'Anna, by following the supplier directions, is in charge for: moving the crate from the track to the site, opening the package, tool positioning in the working area, connecting all the necessary facilities to the tool.

Supplier must check for the correct placement and connection, facilities presence, flow and pressure value. Execute the acceptance procedure, final and functionality test.

3.2 Acceptance

Installation and commissioning, followed by process start-up with demonstration of defined process specification must be performed onsite by the Supplier.

3.3 Documents

Supplier must:

1. Detail configuration of the equipment and list of parts and components
2. Deliver layout of installation and the list of the facilities required for a proper functioning of the tool.
3. Deliver process data
4. Deliver procedures for standard operation and maintenance.
5. Deliver safety instructions
6. CE conformity declaration
7. Describe after sales service and support solution.

The compliance of the equipment to the minimum requirements and to the evaluable features must be evident in the documentation (1-7).

4. Appendix

4.1 Summary table of minimum requirements

The compliance of the equipment to the minimum requirements must be evident in the documentation (paragraph 3.3).

Summary Specifications			
Parameter	Target Specs	Units	Note
8" substrate movement capabilities	8" wafer complete scan		
	≤ 100nm		xy resolution
	≤ +/- 1um		xy position repeatability
	Up to 100 mm		z-axis movement
	360°		rotation
	-30°/ +90°		tilting
resolution at high voltage	1,0nm @ 30kV		
	1,2nm @ 15kV		
	2,0nm @ 3kV		
	3,5nm @ 1kV		
Backscattered electrons detector	Up to 30kV		
continuous magnification range	10x-1'000'000x		
maximum field of view	≥90	mm	
	≥55	mm	at best resolution
accelerating voltage range	200V - 30kV		
current range	2pA - 200nA		
scanning speed per pixel range	20ns - 10ms		
IR CCD chamber internal view	yes		
Active vibration isolation system	yes		
Software for process parameters control	yes		
Software for image acquisition and postprocessing	yes		resolution >16Mpx
chamber working pressure	≤ 9.0E-3	Pa	
Gun vacuum	≤ 3.0E-7	Pa	
conformity	CE mark		
Availability of spare parts	> 10	years	
warranty	1	year	
Shipment and installation	included		

4.2 Summary table of evaluable features

The compliance of the equipment to the technical specification assessable as improvements must be evident in the documentation (paragraph 3.3).

4.2.1 Summary Evaluable Features (qualitative evaluation)			
Item	Parameter	Qualitative evaluation system	Max points
Configuration			
A.1	Automatic functions for optimization of the beam via software	Number and type of automatic function controlled via software. Absence of mechanical elements for column centering and beam alignment. Details must be included in the documentation (paragraph 3.3)	8
A.2	Resolution at low voltages	Good resolution at low voltages and the possibility of beam accelerating voltage below 200V. Resolution data at low voltages must be detailed in the documentation (paragraph 3.3)	16
A.3	Resolution improvement at high voltages	Resolution improvements at high voltages and modality to achieve it are evaluated. Process data, including sample preparation, must be detailed in the documentation (paragraph 3.3)	16
		MAX TECHNICAL POINTS (qualitative part)	40

4.2.2 Summary Evaluable Features (quantitative evaluation)			
Item	Parameter	Quantitative evaluation System	Max points
Configuration			
A.4	Modem for remote software support	If the parameter is absent = 0 If the parameter is present = max points	2
A.5	Number of available ports on chamber for future upgrades	Each additional available port offered by supplier (a) is considered through the formula: P(a) = Offer(a) / Offer max * max points	4
A.6	Lower magnification capability in continuous starting from 1x to 1'000'000x	If the parameter is absent = 0 If the parameter is present = max points	18
Condition			
B.1	Consumable spare parts kit for yearly ordinary maintenance	If the parameter is absent = 0 If the parameter is present = max points	6
B.2	One extra year warranty	If the parameter is absent = 0 If the parameter is present = max points	10
		MAX TECHNICAL POINTS (quantitative part)	40