

› **IMAGING QUALITY OF SEM**
D001: 2023 FPL/INK 29 | R.P. EBELING

30 March 2023

› OVERVIEW

- › Imaging quality depends on a number of factors, including:
 - › Beam settings
 - › Alignment of the electron beam
 - › Magnification range
 - › Imaging acquisition parameters

- › The following factors also play a role, but will not be defined in the requirements:
 - › Signal to noise ratio
 - › Contrast
 - › Depth of field
 - › Distortion free

- › It is expected that the SEM supplier will deliver a system which also performs well on these above mentioned aspects.

- › For the top four factors, requirements are defined in the next slides.

› BEAM SETTINGS

- › Imaging resolution shall be
 - › 1.0 nm or better @ 15 kV, high vacuum
 - › 1.5 nm or better @ 1 kV, high vacuum
 - › 1.5 nm or better @ 15 kV, low vacuum
- › Acceleration voltage
 - › Min. voltage 100 V or less.
 - › Max. voltage 30 kV or higher.
 - › This parameter shall be tuneable in the GUI.
- › Acceleration voltage minimum step size
 - › 50 V or lower.
- › Beam current
 - › Max. beam current 50 nA or higher.
 - › Min. beam current 50 pA or less.
 - › This parameter should be tuneable in the GUI.

› BEAM ALIGNMENT

- › The SEM shall beam alignment shall be tuned upon delivery, to obtain optimum alignment. These alignments include at least:
 - › Gun alignment
 - › Astigmatism correction
 - › Stigmator correction

- › The operator shall be able to at least tune the following parameters, to optimize the image as much as possible:
 - › Focus
 - › Astigmatism
 - › Voltage beam drift

› **MAGNIFICATION RANGE**

- › The SEM shall have a magnification range, as stated in the SEM software GUI, of:
 - › 25x to 100.000x
- › This range is defined to be achieved at eucentric working distance.

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