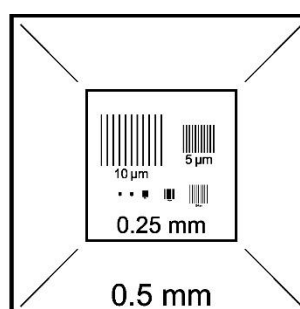
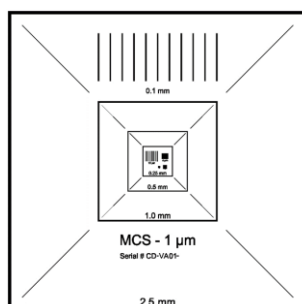


Certificate of Calibration for CD-VA01-0401

EM-Tec MCS-1 Magnification Calibration Standard



Product Numbers: 31-C31000-U, 31-C31000-1, 31-C31000-2, 31-C31000-6, 31-C31000-8, 31-C31000-10

Product Description: EM-Tec MCS-1 Magnification Calibration Standard 2.5mm to 1μm

Product Identifier: CD-VA01-0401

The accuracy of these products was determined by reference comparison to working standards traceable to the National Institute of Standards and Technology (NIST).

Line	Certified average pitch	Number of lines	Certified distance (1σ)	Between	Total expanded uncertainty (3σ)
2.5 mm	2.50 mm	2	2.50 mm ± 0.03%	First and last line	± 0.09%
1.0 mm	1.00 mm	2	1.00 mm ± 0.03%	First and last line	± 0.09%
0.5 mm	0.500 mm	2	0.500 mm ± 0.03%	First and last line	± 0.09%
0.25 mm	0.250 mm	2	0.250 mm ± 0.03%	First and last line	± 0.09%
0.10 mm	0.100 mm	2	0.100 mm ± 0.03%	First and second line	± 0.09%
10 μm	10.01 μm	11	100.07 μm ± 0.03%	First and last line	± 0.09%
5.0 μm	5.00 μm	11	50.02 μm ± 0.03%	First and last line	± 0.09%
2.5 μm	2.50 μm	13	30.03 μm ± 0.03%	First and last line	± 0.09%
1.0 μm	1.00 μm	17	16.04 μm ± 0.03%	First and last line	± 0.09%

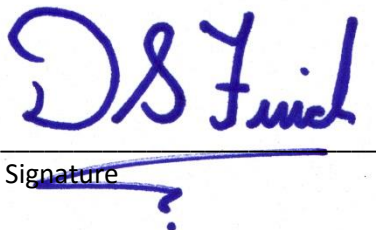
The certified average pitch is derived from the stated certified length that was determined using 10 measurements (taken center-to-center) over the stated number of lines (i.e., length divided by the number of lines minus one). The total expanded uncertainty includes both Type A and Type B uncertainties corrected for sample size using an appropriate Student t-factor.

Equipment used:

Instrument	Model number	Serial #	NIST Certified CD/Recalibration	Resolution	Repeatability
FE-SEM	FEI Verios	9922557	CD-PG01-0211/June 2016	0.9nm	0.03%

Dudley S Finch

Certified by


Signature

April 5th 2016

Date

This certificate shall not be reproduced without the permission of Vof Micro to Nano.

TSB 31-C31000-0401 Certificate of Calibration 2015-08-20 CD-VA01-0401