



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z540-1-1994

MD CALIBRATIONS, LLC
 102 Perry Street
 Douglas, MA 01516
 Michael Denomme Phone: 508 476 7589

CALIBRATION

Valid To: September 30, 2018

Certificate Number: 3335.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Linear Accuracy ³ – Mills, Lathes, Machining Centers, ID/OD Gages	< 3 ft	(50 + 1.5L) μin	Renishaw XL80 laser (A, A+, A-) ⁵
	(≥ 3 to ≤ 7) ft	(50 + 2.0L) μin	
	(> 7 to ≤ 130) ft	(75 + 2.5L) μin	
Straightness and Squareness ³ – Mills, Lathes, Machining Centers	Up to 24 in	(58 + 4L) μin	Master square and indicator
Angle ³ – Mills Lathes, Machining Centers	0° to 10°	(0.2 + 0.2 % V + 0.5M)''	Renishaw XL80 laser
	(0 to 1000)''	(0.2 + 0.2 % V)''	Electronic levels
Rotational Accuracy ³ – Mills, Lathes and Machining Centers	360°	(1.7 + 0.2 % V)''	Renishaw RX10 or XR20 calibrator

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Rotational Accuracy ³ – Trunion Mounted Spindles, Trunion Mounted Tables, and Angles	±180°	(0.5 + 0.7 % V) ^{''} (0.5 + 0.5 % V) ^{''}	AG Davis calibrator with electronic levels AG Davis Calibrator

II. Dimensional Testing¹

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Volumetric Performance ^{3, 6} – Laser Diagonal, Machining Centers	Up to 130 ft	3(75 + 3L) μin	Renishaw XL80 laser
Circular Interpolation ^{3, 6} – Mills Lathes, Machining Centers	(50 to 600) mm	(3.7 + 0.021LB + 0.4 % VR) μm	Renishaw QC10 or QC20 ballbar
Spindle Analysis ^{3, 6} – Mills, Lathes, Machining Centers	(100 to 180 000) RPM +/- 50.0 μm	(0.14 + 0.04S + 0.2R) μm ≤ 10 μm	Lion SEA8 spindle error analyzer
Vibration Analysis ^{3, 6} – Mills Lathes, Machining Centers	(1 to 20) Hz	(3 % A) or (3 % MV)	GTI vibration analyzer

¹ This laboratory offers commercial and field calibration services, as well as dimensional testing service.

² Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ In the statement of CMC, L is the distance measured in inches, V is the maximum measured error in arc seconds, M is the distance optics travel during measurement in inches, LB is the length of ballbar in mm, VR is the measured radial variation in μm , S is the spindle speed in RPM, R is the radial error in μm , A is the maximum acceleration, MV is the maximum velocity.

⁵ As referenced in the ANSI/ASME B5.54, ANSI/ASME B5.57, ISO230, ISO10791, and the ISO13041.

⁶ This test is not equivalent to that of a calibration.

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Accredited Laboratory

A2LA has accredited

MD CALIBRATIONS, LLC

Douglas, MA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSLI Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).



Presented this 28th day of November 2016.

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President and CEO
For the Accreditation Council
Certificate Number 3335.01
Valid to September 30, 2018

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.