



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

NATIONAL CALIBRATION SERVICES OF TENNESSEE, LLC.
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CALIBRATION

Valid To: May 31, 2023

Certificate Number: 1760.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 6}:

I. Dimensional

Parameter/Equipment	Range	CMC ² (±)	Comments
Optical Comparators ³			
Linearity	Up to 12 in	200 μ m	Optical glass masters
Angle	90°, 180°, 270°, 360°	0.04°	

II. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Brinell Hardness Testers at Test Conditions ^{3, 4} –			Indirect verification per ASTM E10
HBW 10/3000/15	(201 to 449) HBW	0.010d HBW	d is the mean of the n mean test diameters in millimeters.
HBW 10/1500/15	(49 to 324) HBW	0.010d HBW	

Parameter/Equipment	Range	CMC ² (±)	Comments
Indirect Verification of Rockwell and Rockwell Superficial Hardness Testers ³	HRA:		ASTM B294, ASTM E18
	Low	0.48 HRA	
	Med	0.42 HRA	
	High	0.41 HRA	
	HRBW:		
	Low	0.64 HRBW	
	Med	0.59 HRBW	
	High	0.59 HRBW	
	HRC:		
	Low	0.38 HRC	
	Med	0.38 HRC	
	High	0.38 HRC	
	HR15N:		
	Low	0.33 HR15N	
	Med	0.39 HR15N	
	High	0.35 HR15N	
	HR30N:		
	Low	0.48 HR30N	
	Med	0.48 HR30N	
	High	0.48 HR30N	
	HR15TW:		
	Low	0.46 HR15TW	
	Med	0.42 HR15TW	
	High	0.37 HR15TW	
	HR45N		
	Low	0.91 HR45N	
	Med	0.87 HR45N	
	High	0.85 HR45N	
	HR30TW:		
	Low	0.58 HR30TW	
	Med	0.57 HR30TW	
	High	0.61 HR30TW	
	HRFW		
	Low	0.46 HRFW	
	Med	0.47 HRFW	
	High	0.45 HRFW	

Parameter/Equipment	Range	CMC ^{2, 5} (±)	Comments
Indirect Verification of Microindentation Hardness Testers ³ (Knoop and Vickers) –			Indirect verification method per ASTM E384, ASTM E92
1 gf ≤ P < 500 gf	(200 to 250) HK (250 to 650) HK > 650 HK	2.9 % HK 2.9 % HK 2.9 % HK	P is the test force
500 gf ≤ P < 1000 gf	(200 to 250) HK (250 to 650) HK > 650 HK	2.9 % HK 2.9 % HK 2.9 % HK	
1 gf ≤ P < 500 gf	(200 to 240) HV (240 to 600) HV > 600 HV	2.9 % HV 2.9 % HV 2.9 % HV	
500 gf ≤ P < 1000 gf	(200 to 240) HV (240 to 600) HV > 600 HV	2.9 % HV 2.9 % HV 2.9 % HV	

¹ This laboratory offers commercial calibration service and field calibration 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 Uncertainty 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. 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 The notation 10/3000/15 gives the conditions of the verification. "10" is the diameter of the indenter in millimeters, "3000" is the test force in kilogram-force, and "15" is the duration of force application in seconds.

⁵ In the statement of (CMC) Uncertainty, percentages (%) are to be read as percent of indicated value.

⁶ This scope meets A2LA's *P112 Flexible Scope Policy*.



Accredited Laboratory

A2LA has accredited

NATIONAL CALIBRATION SERVICES OF TENNESSEE, LLC.

Clarksville, TN

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL 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 April 2017).



Presented this 2nd day of November 2021.

A handwritten signature in blue ink.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1760.01
Valid to May 31, 2023

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