SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

STRUERS LLC
24766 Detroit Road
Westlake, OH 44145
Cory Hamilton Phone: 440 871 0071

CALIBRATION

Valid To: December 31, 2026 Certificate Number: 4097.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 5]:

I. Dimensional

Parameter/Equipment	Range	CMC[2] (±)	Comments
Microscopes[3]			Optical verification by stage micrometer ASTM E1951
	(10 to 230) µm	0.31 µm	100x or greater
	(10 to 360) µm	0.37 µm	60x up to 100x
	(10 to 480) µm	0.37 µm	40x up to 60x
	(20 to 900) µm	0.55 µm	20x up to 40x
	(40 to 3400) µm	0.90 µm	10x up to 20x
	(50 to 7000) µm	1.9 µm	5x up to 10x
	(100 to 45 600) µm	2.9 µm	1x up to 5x
	(800 to 45 600) µm	5.2 µm	Up to 1x

II. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Direct Verification of Knoop & Vickers Hardness Testers[3]			Direct verification method per ASTM: E384, E92; ISO: 6507, 4545.
Verification of the Test Force	(10 to 200) gf (200 to 1000) gf (1 to 150) kgf	0.16 % of range 0.095 % of range 0.056 % of range	Verification of the test force is by load cell per ASTM E4, ISO 7500
Verification of the Device for Measuring Indentation Diameters			Optical verification by stage micrometer
	(0 to 120) µm (0 to 90) µm (0 to 10) µm (10 to 260) µm (10 to 450) µm (20 to 890) µm (40 to 1800) µm (50 to 1600) µm (100 to 4000) µm (200 to 2200) µm (150 to 7100) µm (800 to 7800) µm (400 to 7800) µm (200 to 1800) µm	0.31 µm 0.44 µm 0.37 µm 0.37 µm 0.43 µm 0.60 µm 0.93 µm 1.9 µm 3.4 µm 3.9 µm 2.9 µm 5.2 µm 14 µm 4.8 µm	100x - objectives 80x - objectives 60x-79x - objectives 50x - objectives 21x-49x - objectives 20x - objectives 10x-19x - objectives 5x-9x - objectives 4x - objectives 3x - objectives 2.5x - objectives 0.1x-2.4x - objectives Low Mag - handheld High Mag – handheld
Indirect Verification of Vickers Hardness Testers[3]	(40 to 240) HV (240 to 600) HV > 600 HV	1.8 HV 5.1 HV 7.7 HV	Indirect verification method per ASTM E384, ASTM E92, ISO 6507 (Vickers)
Indirect Verification of Microindentation Hardness Testers (Knoop & Vickers)[3]	(40 to 240) HV (240 to 600) HV (> 600) HV (40 to 250) HK (250 to 650) HK (> 650) HK	2.6 HV 6.6 HV 13 HV 2.7 HK 6.8 HK 10 HK	Indirect verification method per ASTM E384, ASTM E92, ASTM E3246, ISO 4545 (Knoop), ISO 6507 (Vickers)

Parameter/Equipment	Range	CMC[2] (±)	Comments
Direct Verification of Brinell Hardness Testers[3]			
Verification of the Test Force	HBW 1 (1 to 30) kgf HBW 2.5 (6.25 to 187.5) kgf HBW 5 (25 to 750) kgf HBW 10 (100 to 3000) kgf	 0.099 % of range 0.057 % of range 0.11 % of range 0.11 % of range	Verification of the test force is by load cell ASTM E4, ISO 7500
Verification of the Device for Measuring Indentation Diameters	(0 to 120) µm (0 to 90) µm (0 to 210) µm (10 to 260) µm (10 to 450) µm (20 to 890) µm (40 to 1800) µm (50 to 1600) µm (100 to 4000) µm (200 to 2200) µm (150 to 7100) µm (800 to 7800) µm (400 to 7800) µm (200 to 1800) µm	0.31 µm 0.44 µm 0.37 µm 0.37 µm 0.43 µm 0.60 µm 0.93 µm 1.9 µm 3.4 µm 3.9 µm 2.9 µm 5.2 µm 14 µm 4.8 µm	Optical verification by stage micrometer 100x - objectives 80x - objectives 60x-79x - objectives 50x - objectives 21x-49x - objectives 20x - objectives 10x-19x - objectives 5x-9x - objectives 4x - objectives 3x - objectives 2.5x - objectives 0.1x-2.4x - objectives Low Mag - handheld High Mag – handheld
Indirect Verification of Brinell Hardness Testers[3] –			
HBW 10/3000	Low Medium High	1.7 HBW 5.1 HBW 8.4 HBW	Indirect verification method per ASTM E10, ASTM E110, ASTM E3246, ISO 6506
HBW 10/1500	Low High	1.2 HBW 2.8 HBW	
HBW 10/1000	Low High	1.2 HBW 2.6 HBW	
HBW 10/500	Low High	0.92 HBW 1.5 HBW	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Brinell Hardness Testers[3] (cont) –			Indirect verification method per ASTM E10, ASTM E110, ASTM E3246 ISO 6506
HBW 10/250	Low Medium High	0.40 HBW 0.45 HBW 0.52 HBW	
HBW 10/100	Low Medium High	0.39 HBW 0.43 HBW 0.69 HBW	
HBW 5/750	Low Medium High	1.8 HBW 5.2 HBW 7.3 HBW	
HBW 5/250	Low High	1.9 HBW 2.3 HBW	
HBW 5/125	Low High	0.95 HBW 1.4 HBW	
HBW 5/62.5	Low	0.63 HBW	
HBW 2.5/187.5	Low Medium High	1.8 HBW 5.4 HBW 6.8 HBW	
HBW 2.5/62.5	Low High	1.5 HBW 2.1 HBW	
HBW 2.5/31.25	Low High	1.0 HBW 1.5 HBW	
HBW 2.5/15.625	Low	0.56 HBW	
HBW 1/30	Low Medium High	1.6 HBW 4.6 HBW 5.7 HBW	
HBW 1/10	Low High	1.3 HBW 2.3 HBW	
HBW 1/5	Low High	0.81 HBW 1.6 HBW	
HBW 1/2.5	Low	0.71 HBW	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Direct Verification of Rockwell Hardness Testers[3]			Direct verification method per ASTM E18, ISO 6508
Verification of the Test Force –			
Rockwell	(10 to 150) kgf	0.096 % of range	Verification of the test force is by load cell ASTM E4, ISO 7500
Rockwell Superficial	(3 to 45) kgf	0.070 % of range	
Verification of the Depth Measuring Device[3] –			
Rockwell	(0 to 260) µm	0.17 µm	Kal rock depth measuring device
Rockwell Superficial	(0 to 140) µm	0.17 µm	
Verification of the Machine Hysteresis	(100 & 130) HR	0.18 HR	Test blocks
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Testers[3]	HRA: Low Medium High HRBW: Low Medium High HRC: Low Medium High HRD: Low Medium High	 0.56 HRA 0.29 HRA 0.22 HRA 1.4 HRBW 1.0 HRBW 0.67 HRBW 0.48 HRC 0.44 HRC 0.40 HRC 0.37 HRD 0.47 HRD 0.33 HRD	Indirect verification method per ASTM E18, ASTM E110, ISO 6508

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Testers[3] (cont)	HREW: Low Medium High HRFW: Low Medium High HRGW: Low Medium High HRHW: Low High HRKW: Low Medium High HRLW: Low High HRMW: Low High HRPW: Low High HRRW: Low High HRSW: Low High HRVW: Low High	 0.84 HREW 0.71 HREW 0.60 HREW 0.51 HRFW 0.59 HRFW 0.48 HRFW 1.3 HRGW 0.81 HRGW 0.60 HRGW 0.47 HRHW 0.49 HRHW 0.93 HRKW 0.64 HRKW 0.60 HRKW 1.1 HRLW 0.66 HRLW 1.1 HRMW 0.60 HRMW 0.92 HRPW 1.1 HRPW 1.2 HRRW 1.2 HRRW 1.1 HRSW 1.0 HRSW 0.74 HRVW 0.32 HRVW	Indirect verification method per ASTM E18, ASTM E110, ISO 6508

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Testers[3] (cont)	HR15N: Low Medium High HR30N: Low Medium High HR45N: Low Medium High HR15TW: Low Medium High HR30TW: Low Medium High HR45TW: Low Medium High HR15WW: Low High HR30WW: Low High HR45WW: Low High HR15XW: Low High HR30XW: Low High	 0.59 HR15N 0.37 HR15N 0.45 HR15N 0.64 HR30N 0.50 HR30N 0.45 HR30N 0.65 HR45N 0.49 HR45N 0.50 HR45N 0.73 HR15TW 0.68 HR15TW 0.59 HR15TW 0.93 HR30TW 0.71 HR30TW 0.58 HR30TW 1.1 HR45TW 0.94 HR45TW 0.65 HR45TW 0.71 HR15WW 0.84 HR15WW 0.95 HR30WW 0.83 HR30WW 0.77 HR45WW 0.95 HR45WW 0.44 HR15XW 0.46 HR15XW 0.34 HR30XW 0.39 HR30XW	Indirect verification method per ASTM E18, ASTM E110, ISO 6508

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Indirect Verification of Rockwell Hardness & Rockwell Superficial Hardness Testers[3] (cont)	HR45XW: Low High HR15YW: Low High HR30YW: Low High HR45YW: Low High	 0.54 HR45XW 0.58 HR45XW 0.68 HR15YW 0.77 HR15YW 0.46 HR30YW 0.61 HR30YW 0.68 HR45YW 0.64 HR45YW	Indirect verification method per ASTM E18, ASTM E110, ISO 6508
Force – Load Cell Compression			ASTM E74, ISO 376
(0 to 2) kgf	(Up to 0.01) kgf (0.01 to 0.05) kgf (0.05 to 2) kgf	1.1 % of rdg. 0.14 % of rdg. 0.064 % of rdg.	Troemner class 2 weights
(0 to 15) kgf	(Up to 0.5) kgf (0.5 to 3) kgf (3 to 15) kgf	0.2 % of rdg. 0.069 % of rdg. 0.059 % of rdg.	Troemner class 2 weights
(0 to 20) kgf	(Up to 0.01) kgf (0.01 to 0.1) kgf (0.1 to 0.3) kgf (0.3 to 3) kgf (3 to 6.25) kgf (6.25 to 20) kgf	3.4 % of rdg. 0.67 % of rdg. 0.12 % of rdg. 0.066 % of rdg. 0.035 % of rdg. 0.019 % of rdg.	Troemner class 2 weights
(0 to 50) kgf	(Up to 1.5) kgf (1.5 to 5) kgf (5 to 15) kgf (15 to 50) kgf	0.30 % of rdg. 0.088 % of rdg. 0.061 % of rdg. 0.059 % of rdg.	Troemner class 2 weights Morehouse UCM
(0 to 706.08) N	(Up to 14.71) N (14.71 to 49.03) N (49.03 to 117.68) N (117.68 to 706.08) N	0.13 % of rdg. 0.089 % of rdg. 0.065 % of rdg. 0.058 % of rdg.	Troemner class 2 weights

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Force – Load Cell Compression (cont)			ASTM E74, ISO 376
(0 to 200) kgf	(Up to 10) kgf (10 to 60) kgf (60 to 120) kgf (120 to 200) kgf	0.46 % of rdg. 0.083 % of rdg. 0.069 % of rdg. 0.069 % of rdg.	Morehouse UCM
(0 to 1000) kgf	(Up to 100) kgf (100 to 400) kgf (400 to 700) kgf (700 to 1000) kgf	0.12 % of rdg. 0.081 % of rdg. 0.077 % of rdg. 0.074 % of rdg.	Morehouse UCM
(0 to 5000) kgf	(Up to 500) kgf (500 to 1250) kgf (1250 to 2000) kgf (2000 to 5000) kgf	0.25 % of rdg. 0.14 % of rdg. 0.088 % of rdg. 0.070 % of rdg.	Morehouse UCM
Force – Measuring Equipment[3]	(Up to 80) N (100 to 700) N	0.17 % of rdg. 0.13 % of rdg.	Verification by load cell per ASTM E4
Indenter Approach Velocity[3]	(15 to 200) µm/s	0.28 µm/s	Digital stopwatch & dial indicator or gauge block

III. Time & Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Test Cycle – Direct Verification of Hardness Testers[3]	(1 to 60) s	0.21 s	Digital stopwatch

[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 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] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

[5] This scope meets A2LA's *P112 Flexible Scope Policy*.

Accredited Laboratory

A2LA has accredited

STRUERS LLC

Westlake, OH

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 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 January 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 4097.01
Valid to December 31, 2026
Revised January 6, 2025

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