



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

CORPORATE CONSULTING, SERVICE, & INSTRUMENTS, INC.
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CALIBRATION

Valid To: July 31, 2024

Certificate Number: 1424.01

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 ^{2,5} (±)	Comments
Micrometers – Outside Diameter	Up to 4 in	(64 + 4L) μin	Direct comparison with ASME Grade 0 gauge blocks and optical flats. ASTM D5947-11 Parts 6; 8; Annex A.1
Calipers	Up to 12 in	320 μin 360 μin	Direct comparison with ASME Grade 0 gauge blocks Master caliper checker
Thickness Gauge ³	Up to 3 in Total mass applied (0 to 700) g	140 μin 720 mg	Direct comparison with ASME Grade 0 gauge blocks; ASTM D3767-03 (2014) parts 9 – 13. ASTM D5947-11 parts 6; 8; annex A1; ASTM D1056-14 Part 15.3.2 ASTM D751-06 Part 9.1 ISO 815-1 Part 4.4 Direct comparison with certified electronic pan balance-force calculated (mass over area)

Parameter/Equipment	Range	CMC ² (±)	Comments
Cutting Dies	Up to 12 in	620 μin 380 μin	Hand tools CMM
Surface Finish	(8 to 32) μin AA	4.9 μin AA	ASTM D395. ASTM D3182

II. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Durometer ⁴ –			
Type OO, Type OOO Type OOO-S Type M	(0 to 113) gf (0 to 113) gf (0 to 197) gf (0 to 79) gf	0.37 Duros 0.38 Duros 0.39 Duros 0.35 Duros	ASTM D2240-15 parts (5 – 10) Triple beam balance
Type A, B Type O, E Type C, D Type DO	(0 to 822) gf (0 to 4436) gf	0.38 Duros 0.37 Duros 0.39 Duros 0.36 Duros	DuroCalibrator
Indenter Geometry			Optical inspection under magnification
Length	Up to 1 in	800 μin	
Diameter	Up to 1 in	780 μin	
Angle	(0 to 90) °	0.14°	
Radius	Up to 0.5 in	780 μin.	
Digital Display	(0 to 100) Duros	0.06 Duros	
Extension	Up to 1 in	300 μm	Direct verification
IRHD			
Type M force calculation by differential indentation	Up to 0.300 mm	140 μin (0.0036 mm) 0.94 points	ASTM D1415-06 Parts 3.11, 3.12, Table 1 and Table 3
Dimensions			ISO 48 Parts 5.2.1 – 5.2.5, Table 1 and Table 3
Diameter			
Ball	(0.39 to 0.40) mm	330 μin (0.0084 mm)	Direct verification with certified calipers
Foot OD	(3.20 to 3.50) mm		
Foot ID	(0.85 to 1.15) mm		
Mass	(0 to 200) g	0.49 mg	Direct verification with certified balance

Parameter/Equipment	Range	CMC ² (±)	Comments
Durometer ⁴ – (cont)			
IRHD Type N and S2 force calculation by differential indentation	(0 to 1.8) mm	140 μin (0.0036 mm) 0.53 points	ASTM D1415-06 Parts 3.11, 3.12, Table 1 and Table 3 ISO 48 Parts 5.2.1 – 5.2.5, Table 1 and Table 3
Dimensions Diameter Ball Foot OD Foot ID	(2.49 to 2.51) mm (19 to 21) mm (5 to 7) mm	330 μin (0.0084 mm)	Direct verification with certified calipers
Mass	(0 to 1000) g	9.8 mg	Direct verification with certified balance
D2240 Durometer Hardness Test Blocks	All scales	1.5 points	Certified durometer
D1415/ISO 48 Durometer Hardness Test Blocks	Type M Type S2 / N	0.94 points 0.53 points	Certified durometer
Resiliometer	(0 to 100) points	1.7 points	ASTM D2632-15 parts (5 – 11)
Resiliometer Spring	(0 to 100) points	2.3 points	ASTM D2632-15 parts (5 – 11)

Parameter/Equipment	Range	CMC ² (±)	Comments
Mooney Viscometer ³ –	(0 to 100) Mooney units	0.38 Mooney units	ASTM D1646 15 (2012) parts 6; 9; 10-12; 14; 15
	(20 to 375) °C	0.36 °C	Direct verification
	(0 to 5) RPM	0.2 RPM	
Compression	(0 to 1000) lbf (1001 to 2000) lbf (2001 to 3000) lbf (3001 to 4000) lbf (4001 to 5000) lbf	4.8 lbf 9.5 lbf 17 lbf 25 lbf 28 lbf	
Torque	(0 to 73.5) in·lbf (100 Mooney units)	0.28 in·lbf	Manufacturer's instructions & direct verification
Rheometers ³ –			
Oscillating Disc Moving Die	(0 to 200) in·lbf	0.46 in·lbf	ASTM D2084-11, parts 6, 9-12
	(0 to 200) in·lbf	0.46 in·lbf	ASTM D5289-12, part 6, 8-10
	(20 to 375) °C	0.36 °C	Direct verification
	(0 to 100) RPM	0.2 RPM	
Compression	(0 to 1000) lbf (1001 to 2000) lbf (2001 to 3000) lbf (3001 to 4000) lbf (4001 to 5000) lbf	4.8 lbf 9.5 lbf 17 lbf 24 lbf 28 lbf	
Torque	(0 to 200) in·lbf	0.46 in·lbf	Manufacturer's instructions & direct verification
Plastometer –	Up to 1 in	300 µin	ASTM D926-08 (2013) parts 5; 9; 10; 11
Compression	(0 to 25) lbf	0.0012 lbf	(plate parallelism and force)

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Brittleness Point ³ and Temperature Retraction ³	(0 to -90) °C Striker Radius Striker Speed	0.36 °C 780 μin 0.84 s	ASTM D2137-15, part 5 and ASTM D746-14, part 6 for Brittleness Point direct verification with radius gauge and timed speed measurement.
	(0 to -90) °C Up to 12 in	0.36 °C 320 μm	ASTM D1329-08, part 5 for temperature retraction and direct comparison with ASME Grade 0 gauge blocks.
Scales and Balances ³	(0 to 1000) mg (0 to 200) g (0 to 1000) g	0.26 mg + 0.6R 0.49 mg + 0.6R 9.8 mg + 0.6R	Direct comparison with OIML E2 weights ASTM E898-88 (2013) parts 7.1; 7.2; 7.3; 7.5 & 7.6
	(1000 to 6000) g	0.75 g + 0.6R	Direct comparison with NIST 105-1 Class F weights
Abrader ³ – RPM Vacuum Table TIR Weights	72 RPM 55 in H ₂ O 0.002 in 250 g 500 g 1000 g	0.2 RPM 1.6 in H ₂ O 540 μin 0.014 g 0.014 g 0.014 g	Manufacturer's instructions to ASTM D3389-15, part 5
Mass	(> 1 to 1000) mg (>1 to 200) g (>200 to 1000) g	0.26 mg 0.49 mg 9.8 mg	Direct comparison with OIML E2 weights
	(>1000 to 6000) g	0.75 g	Direct comparison with NIST 105-1 Class F weights
Shore Durometric – A-Scale D-Scale	(0 to 822) g (0 to 4536) g	0.6 Duros 0.6 Duros	NAVAIR 17-20MF-17 T-4

Parameter/Equipment	Range	CMC ² (±)	Comments
Brookfield Viscometer ³	@10 cP nominal @1000 cP nominal @5000 cP nominal @12 500 cP nominal @100 000 cP nominal	0.38 cP 13 cP 67 cP 200 cP 1100 cP	ASTM D2196-15, part 5; 6; 7; 11; 15 & manufacturer's instructions
RPM – Contact/Optical Measure ³	(1 to 999.9) rpm	0.2 rpm	Direct Verification
Extensometer / Tensile Tester ³ – Tension & Compression Distance	(0 to 250) lbf (0 to 1000) lbf (1001 to 2000) lbf (2001 to 3000) lbf (3001 to 4000) lbf (4001 to 5000) lbf Up to 12 in	1.1 lbf 4.8 lbf 9 lbf 16 lbf 24 lbf 28 lbf 320 µin	ASTM E4 -16, parts 7; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 22; 23 E83-16 parts 4; 5 7; 8; Manufacturer's instructions and direct verification ASTM D412-16; D624-16; D413-98; D429-14. F152-09; D638-14. D1708-13; D1938-14. D2343-09; D3916-08. D4964-96; D2261-13. D4777-88; ASTM D3822/D3822M-14. D2256/D2256M-10
Torque Wrenches	4 lbf·in to 600 lbf·ft	0.79 % rdg	ASME B107.300
Pressure Gages	(0 to 6) psig (>6 to 30) psig (30 to 100) psig (>100 to 500) psig (500 to 1000) psig (>1000 to 5000) psig (>5000 to 15 000) psig	0.02 psi 0.1 % rdg + 0.1 psi 0.18 psi 0.1 % rdg + 0.8 psi 2.2 psi 0.1 % rdg + 1.2 psi 0.1 % rdg + 2.7 psi	ASME B40.100

III. Thermodynamics

Parameter/Equipment	Range	CMC ² (±)	Comments
Oven Calibration ³ – Temperature Air flow velocity vane anemometer Air flow velocity hot wire anemometer	(68 to 707) °F (1000 to 4000) fpm (0 to 5) m/s (0 to 10) m/s (0 to 30) m/s (0 to 45) m/s	1.3 °F 1.3 + 5.1 % <i>r</i> 0.04 + 1.2 % <i>r</i> 0.30 + 1.2 % <i>r</i> 0.42 + 1.2 % <i>r</i> 0.64 + 1.2 % <i>r</i>	ASTM E145-94 (2011), part 4.1 ASTM D7969-16, parts 4; 5; 6; 7; X.1 Digital survey recorder, Type K thermocouple <i>r</i> is the ventilation rate – calculated air changes per hour
Ozone Monitors and Chambers ³	(0 to 10) parts in 10 ⁸ (pphm) (10 to 100) parts in 10 ⁸ (pphm)	0.11 parts in 10 ⁸ 1 part in 10 ⁸	ASTM D4575-09 (2015), part 6; 7; 8; 9; 10; 15 X1; X2 ASTM D1149-07, parts 5; 7; 11; 15; 18; 21 field service available for chamber only
Temperature – Measure ³	(-90 to 0) °C (0 to 375) °C	0.36 °C 0.36 °C	Direct verification
Temperature – Measuring Devices	(25 to 100) °C (101 to 375) °C	0.37 °C 0.6 °C	Dry well temperature calibrator

IV. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Time – Measure ³	Up to 2 Hours Up to 120 s	0.84 s 0.84 s	Direct verification D2240-15, part 5.1 operating stand rate of descent

¹ This laboratory offers commercial and field calibration services.

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. 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 Calibration is performed according to manufacturer specifications and measure in gram force.

⁵ In the statement of the CMC, L is the numerical value of the nominal length of the device measured in inches and R is the resolution of the device under test.

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



Accredited Laboratory

A2LA has accredited

CORPORATE CONSULTING SERVICE & INSTRUMENTS INC

Akron, 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 December 2021.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1424.01
Valid to July 31, 2024
Revised June 28, 2024

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