



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

CORPORATE CONSULTING, SERVICE, & INSTRUMENTS, INC.

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CALIBRATION

Valid To: February 29, 2020

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<sup>1</sup>:

I. Dimensional

Parameter/Equipment	Range	CMC <sup>2, 5</sup> ( $\pm$ )	Comments
Micrometers – Outside Diameter	Up to 4 in	(64 + 4L) $\mu$ in	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 $\mu$ in  360 $\mu$ in	Direct comparison with ASME Grade 0 gauge blocks  Master caliper checker
Thickness Gauge <sup>3</sup>	Up to 3 in  Total mass applied (0 to 700) g	140 $\mu$ in  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 <sup>2</sup> (±)	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 <sup>2</sup> (±)	Comments
Durometer <sup>4</sup> –			
Type OO,	(0 to 113) gf	0.37 duros	ASTM D2240-15 parts (5 – 10) Triple beam balance
Type OOO	(0 to 113) gf	0.38 duros	
Type OOO-S	(0 to 197) gf	0.39 duros	
Type M	(0 to 79) gf	0.35 duros	
Type A, B	(0 to 822) gf	0.38 duros	DuroCalibrator
Type O, E		0.37 Duros	
Type C, D	(0 to 4436) gf	0.39 Duros	
Type DO		0.36 Duros	
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.	Direct verification
Digital Display	(0 to 100) Duro	940 µin	
Extension	Up to 1 in	0.06 Duros	
		300 µm	
IRHD			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
Type M force calculation by differential indentation	Up to 0.300 mm	140 µin (0.0036 mm) 0.94 points	
Dimensions			
Diameter			
Ball			Direct verification with certified calipers
Foot OD	(0.39 to 0.40) mm	330 µin (0.0084 mm)	
Foot ID	(3.20 to 3.50) mm		Direct verification with certified balance
Mass	(0.85 to 1.15) mm (0 to 200) g	0.49 mg	

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Durometer <sup>4</sup> – (cont.)  IRHD Type N and S2 force calculation by differential indentation  Dimensions Diameter Ball Foot OD Foot ID  Mass	(0 to 1.8) mm     (2.49 to 2.51) mm (19 to 21) mm (5 to 7) mm  (0 to 1000) g	140 µin (0.0036 mm) 0.53 points     330 µin (0.0084 mm)     9.8 mg	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  Direct verification with certified calipers  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, Resiliometer Spring	(0 to 100) points	1.7 points 2.3 points	ASTM D2632-15 parts (5 – 11)
Mooney Viscometer <sup>3</sup> –      Compression      Torque	(0 to 100) Mooney units  (20 to 375) °C  (0 to 5) RPM  (0 to 1000) lbf (1001 to 2000) lbf (2001 to 3000) lbf (3001 to 4000) lbf (4001 to 5000) lbf  (0 to 73.5) in·lbf (100 Mooney units)	0.38 Mooney units  0.36 °C  0.2 RPM  4.8 lbf 9.5 lbf 17 lbf 25 lbf 28 lbf  0.28 in·lbf	ASTM D1646 0715 (2012) parts 6; 9; 10-12; 14; 15  Direct verification          Manufacturer's instructions & direct verification

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Rheometers <sup>3</sup> –			
Oscillating Disc Moving Die	(0 to 200) in·lbf (0 to 200) in·lbf	0.46 in·lbf 0.46 in·lbf	ASTM D2084-11, parts 6, 9-12 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 lbf·in	0.46 in·lbf	Manufacturer's instructions & direct verification
Plastometer –	Up to 1 in	300 µin	ASTM D926-08 (2013)
Compression	(0 to 25) lbf	0.0012 lbf	parts 5; 9; 10; 11 (plate parallelism and force)
Brittleness Point <sup>3</sup> and Temperature Retraction <sup>3</sup>	(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.

Parameter/Equipment	Range	CMC <sup>2, 5</sup> ( $\pm$ )	Comments
Scales and Balances <sup>3</sup>	(0 to 1000) mg (0 to 200) g (0 to 1000) g  (1000 to 6000) g	0.26 mg + 0.6R 0.49 mg + 0.6R 9.8 mg + 0.6R  0.75 g + 0.6 R	Direct comparison with OIML E2 weights ASTM E898-88 (2013) parts 7.1; 7.2; 7.3; 7.5 & 7.6  Direct comparison with NIST 105-1 Class F weights
Abrader <sup>3</sup> –  RPM Vacuum Table TIR  Weights	72 rpm 55 in H <sub>2</sub> O 0.002 in  250 g 500 g 1000 g	0.2 RPM 1.6 in H <sub>2</sub> O 540 $\mu$ in  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  (>1000 to 6000 g)	0.26 mg 0.49 mg 9.8 mg  0.75 g	Direct comparison with OIML E2 weights   Direct comparison with NIST 105-1 Class F weights
Shore Durocalibrator –  A-Scale D-Scale	(0 to 822) g (0 to 4536) g	0.6 Duros 0.6 Duros	NAVAIR 17-20MF-17 T-4
Brookfield Viscometer <sup>3</sup>	@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 <sup>3</sup>	(1 to 999.9) rpm	0.2 rpm	Direct Verification

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Extensometer / Tensile Tester <sup>3</sup> –	(0 to 250) lbf	1.1 lbf	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;
Tension& 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 lbf 16 lbf 24 lbf 28 lbf	Manufacturer's instructions and direct verification ASTM D412-16; D624-16; D413-98; D429-14; F152-09; D638-14;
Distance	Up to 12 in	320 µin	D1708-13; D1938-14; D2343-09; D3916-08; D4964-96; D2261-13; D4777-88; ASTM D3822/D3822M-14; D2256/D2256M-10

### III. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Oven Calibration <sup>3</sup> –			ASTM E145-94 (2011), part 4.1
Temperature	(68 to 707) °F	1.3 °F	ASTM D7969-16, parts 4; 5; 6; 7; X.1
Air flow velocity vane anemometer	(1000 to 4000) fpm	1.3 + 5.1 % <i>r</i>	Digital survey recorder, Type K thermocouple
Air flow velocity hot wire anemometer	(0 to 5) m/s (0 to 10) m/s (0 to 30) m/s (0 to 45) m/s	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>	<i>r</i> is the ventilation rate – calculated air changes per hour
Ozone Monitors and Chambers <sup>3</sup>	(0 to 10) parts in 10 <sup>8</sup> (pphm)  (10 to 100) parts in 10 <sup>8</sup> (pphm)	0.11 parts in 10 <sup>8</sup>  1 part in 10 <sup>8</sup>	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

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

<sup>1</sup> This laboratory offers commercial and field calibration services.

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> Calibration is performed according to manufacturer specifications and measure in gram force.

<sup>5</sup> 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.



## *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 17025:2005 *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 8 January 2009).



Presented this 10<sup>th</sup> day of January 2018.

A blue ink signature of a person, likely the Vice President of Accreditation Services, written over a horizontal line.

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 1424.01  
Valid to February 29, 2020  
Revised January 27, 2020

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