



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

UNIVERSITY OF DAYTON RESEARCH INSTITUTE  
 STRUCTURE AND COMPONENT CHARACTERIZATION GROUP  
 1031 Irving Avenue  
 Dayton, OH 45469  
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CALIBRATION

Valid To: July 31, 2019

Certificate Number: 3790.01

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> (±)	Comments
Displacement – Indicator	Up to 1 in	120 μin	Digital micrometer, head block
Displacement – Sensor <sup>3</sup>	Up to 1 in Up to 10 in	(120 + 180L) μin 0.0016 in	Digital micrometer Digital micrometer, gage blocks
Micrometers	Up to 12 in	(52 + 6L) μin	Gage blocks
Calipers	Up to 12 in	(280 + 6L) μin	Gage blocks

II. Dimensional Testing<sup>1</sup>

Parameter/Equipment	Range	CMC <sup>2</sup> (±)	Comments
Length <sup>4</sup> – X Axis Y Axis Z Axis	1000 mm 625 mm 500 mm	0.013 mm 0.013 mm 0.013 mm	CMM

### III. Electrical – DC/Low Frequency

Parameter/Equipment	Frequency/Range	CMC <sup>2,5</sup> (±)	Comments
Electrical Simulation of Thermocouples <sup>3</sup>			
Type J	(-200 to 1200) °C	0.5 °C	Fluke 701
Type K	(-200 to 1370) °C	0.5 °C	
Type T	(-250 to -200) °C (-200 to 400) °C	0.8 °C 0.5 °C	
DC Voltage – Measure <sup>3</sup>	Up to 2 V <sub>DC</sub> Up to 20 V <sub>DC</sub>	(0.022 % + 0.00014) V <sub>DC</sub> (0.022 % + 0.0012) V <sub>DC</sub>	DMM

### IV. Fluid Quantities

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Viscosity – Measuring Equipment			
Ford Cup	No. 4	1 %	Viscosity standard time/temperature
Zahn Cup	No. 2	2 %	

### V. Mechanical

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Force – (Linear) Tension or Compression <sup>3</sup>	Up to 500 lbf Up to 500 lbf (500 to 10 000) lbf (2000 to 50 000) lbf	0.044 + 0.011 % lbf (0.28 + 0.06 %) lbf (0.036 % + 0.28) lbf (0.04 % + 10) lbf	Dead weights Load cell using DC supply and 2-channel nano-voltmeter

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Force (Torsional) – Tension or Compression <sup>3</sup>	Up to 2000 lb-ft	(0.1 % + 0.22) lb-ft	Lever arm and dead weights
	(50 to 1900) lb-ft	(0.1 % + 0.5) lb-ft	Torque cell using DC supply and 2-channel nano-voltmeter
Pressure <sup>3</sup>	(-13.5 to 50) psig (50 to 250) psig (250 to 2500) psig	0.05 psig (0.02 % + 0.04) psig (0.005 % + 1) psig	Pressure indicator
Scales and Balances <sup>3</sup>	1 mg to 50 g 50 g to 6.1 kg (6.1 to 32) kg	0.002 mg/g + 0.01 mg + 0.8R 0.001 mg/g + 0.8R 0.0005 mg/g + 0.8R	ASTM Class 4
Mass	(1 to 220) g (220 to 410) g 410 g to 4.1 kg (4.1 to 32) kg	0.0007 mg/g + 0.15 mg 1.2 mg 12 mg 120 mg	ASTM Class 4

## VI. Thermodynamics

Parameter/Equipment	Range	CMC <sup>2, 5</sup> (±)	Comments
Relative Humidity – Measure <sup>3</sup>	(0 to 100) % RH  @ (-70 to -20) °C @ (-20 to 40) °C @ (40 to 180) °C	  (1.1 % + 1.1 % RH) (0.6 % + 0.9 % RH) (1.1 % + 1.1 % RH)	Vaisala MI70 and HMP77
Temperature – Ovens and Chambers <sup>3</sup>	(-70 to -20) °C (-20 to 180) °C  (-80 to 260) °C	(0.22 % + 0.2) °C (0.16 % + 0.12) °C  0.85 °C	Vaisala MI70 and HMP77  9-channel thermocouple calibration system

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Temperature <sup>3</sup> – Measuring Equipment and Indicating Devices	(-100 to 0) °C (0 to 260) °C	0.00025 °C/°C + 0.04 °C 0.040 °C	PRT and indicator
Temperature – Measure	(-200 to -130) °C (-130 to 450) °C (450 to 660) °C	0.0077 °C 0.00002 °C/°C + 0.013 °C 0.00002 °C/°C + 0.018 °C	SPRT and HP 3458A

## VII. Time and Frequency

Parameter/Equipment	Range	CMC <sup>2,5</sup> (±)	Comments
Time Interval <sup>3</sup> – Measure	Up to 24 hours	480 ms	Electronic stop watch
Speed (Rotation) <sup>3</sup> – Measure	Up to 120 000 RPM	0.2 %  0.01 %	Oscilloscope by comparison  Counter timer by comparison

<sup>1</sup> This laboratory offers conditionally available commercial dimensional testing and calibration service.

<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>This laboratory meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

<sup>5</sup>In the statement of CMC, percent is defined as percent of reading.  $L$  is the numerical value of the length of the device measured in inches.  $R$  is the resolution of the unit under test.

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## *Accredited Laboratory*

A2LA has accredited

# UNIVERSITY OF DAYTON RESEARCH INSTITUTE - STRUCTURE AND COMPONENT CHARACTERIZATION GROUP

*Dayton, 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 31<sup>st</sup> day of July 2017.



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President and CEO  
For the Accreditation Council  
Certificate Number 3790.01  
Valid to July 31, 2019  
Revised September 10, 2018

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