SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

THE LUBRIZOL CORPORATION
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CALIBRATION

Valid To: November 30, 2025 Certificate Number: 2115.01

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. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
DC Voltage – Generate	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	18 µV/V + 1 µV 9.2 µV/V + 2 µV 9.5 µV/V + 20 µV 15 µV/V + 150 µV 15 µV/V + 1.5 mV	Fluke 5520A
DC Voltage – Measure	(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V	6.1 µV/V + 0.12 µV 3.6 µV/V + 0.50 µV 3.8 µV/V + 5 µV 5.6 µV/V + 50 µV 5.6 µV/V + 500 µV	Fluke 8508A
DC Current – Generate	(0 to 330) µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 3 A (1.1 to 3) A (3 to 11) A (11 to 20) A	0.012 % + 0.02 µA 63 µA/A + 0.05 µA 78 µA/A + 0.25 µA 79 µA/A + 2.5 µA 0.016 % + 40 µA 0.031 % + 40 µA 0.04 % + 500 µA 0.078 % + 750 µA	Fluke 5520A

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
DC Current – Measure	(0 to 200) µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	30 µA/A + 400 pA 30 µA/A + 4 nA 30 µA/A + 40 nA 55 µA/A + 800 nA 0.018 % + 16 µA 0.04 % + 400 µA	Fluke 8508A
DC Resistance – Generate	(0 to 11) Ω (11 to 110) Ω 110 Ω to 1.1 kΩ (1.1 to 11) kΩ (11 to 110) kΩ 110 kΩ to 1.1 MΩ	34 µΩ/Ω + 0.001 Ω 23 µΩ/Ω + 0.0014 Ω 23 µΩ/Ω + 0.002 Ω 24 µΩ/Ω + 0.02 Ω 24 µΩ/Ω + 0.2 Ω 26 µΩ/Ω + 2 Ω	Fluke 5520A
DC Resistance – Measure	(0 to 2) Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 1 GΩ	31 µΩ/Ω + 4 µΩ 9.3 µΩ/Ω + 14 µΩ 8.8 µΩ/Ω + 140 µΩ 7.9 µΩ/Ω + 1.4 mΩ 6.2 µΩ/Ω + 14 mΩ 4.2 µΩ/Ω + 100 mΩ 7.2 µΩ/Ω + 1 Ω 13 µΩ/Ω + 10 Ω 47 µΩ/Ω + 100 Ω 96 µΩ/Ω + 10 kΩ	Fluke 8508A
Electrical Calibration of Thermocouples – Generate & Measure			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.30 °C 0.12 °C 0.11 °C 0.12 °C 0.30 °C	Fluke 5520A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.23 °C 0.14 °C 0.13 °C 0.15 °C 0.13 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouples – Generate & Measure (cont)			
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.22 °C 0.15 °C 0.14 °C 0.18 °C 0.26 °C	Fluke 5520A
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.38 °C 0.16 °C 0.12 °C 0.11 °C	
Electrical Calibration of RTDs – Generate & Measure			
Pt 385, 100 Ω	(-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.039 °C 0.054 °C 0.070 °C 0.078 °C 0.093 °C 0.18 °C	Fluke 5520A; 4 wire compensation

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Voltage – Measure			
(0 to 200) mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1000) V	(40 to 100) Hz	0.012 % + 5 µV 97 µV/V + 24 µV 92 µV/V + 240 µV 97 µV/V + 2.4 mV 0.013 % + 25 mV	Fluke 8508A

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Current – Measure			
(0 to 200) µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA	10 Hz to 10 kHz	0.03 % + 24 nA 0.029 % + 240 nA 0.029 % + 2.4 µA 0.013 % + 24 µA	Fluke 8508A
200 mA to 2 A (2 to 20) A	10 Hz to 2 kHz	0.057 % + 240 µA 0.072 % + 2.4 mA	

II. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Gas Flow – Measure	Up to 100 sccm Up to 5 slm Up to 40 slm Up to 80 slm	0.26 % 0.23 % 0.23 % 0.33 %	DHI Molbox 1 system with laminar element
	Up to 300 slm	0.44 %	Fluke Molbox S sonic element
Fluid Flow – Measure	Up to 1.367 L/min Up to 18.17 L/min Up to 226.7 L/min Up to 725.8 L/min	0.16 % + 0.09 mL/m 0.16 % + 0.09 mL/m 0.16 % + 0.09 mL/m 0.16 % + 0.09 mL/m	Coriolis flow meters
Fuel Flow Measurement System	(50 to 700) g	0.2 %	Gravimetric method – totalized fuel systems
POVA – Piston Operated Volumetric Apparatus – Burettes	(0.1 to 1.0) mL (1.0 to 2.0) mL (2.0 to 5.0) mL (5.0 to 10.0) mL (10.0 to 20.0) mL (20.0 to 25.0) mL (25.0 to 50.0) mL	2.6 µL 4.9 µL 7.9 µL 13 µL 25 µL 32 µL 58 µL	Gravimetric method ISO-8655-6 using analytical balances

III. Mechanical

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Tachometers	Up to 9000 rpm	0.58 rpm	Fluke 5520A
RPM – Measure	Up to 9000 rpm	1.8 rpm	Shimpo DT-205L
Barometric Pressure – Measure	(600 to 1100) mBar	0.066 mBar	Fluke 6270A w/ modules PM600-BG15K, PM600-A200K
Pneumatic Pressure – Measure	Up to 0.65 psig Up to 2.2 psig Up to 8.7 psig Up to 30 psig Up to 100 psig Up to 500 psig Up to 1000 psig	0.000 38 psig 0.000 31 psig 0.000 12 psig 0.0038 psig 0.012 psig 0.031 psig 0.057 psig	Fluke 6270A w/ modules PM600-BG15K, PM600-A200K, PM500-G200K PM600-A700K Ruska 7250i
Vacuum – Measure	Up to 1.32 in Hg Up to 4.48 in Hg Up to 29.8 in Hg	0.0008 in Hg 0.0016 in Hg 0.0045 in Hg	Fluke 6270A w/ modules PM600-BG15K, PM600-A200K
Torque – Measure	(0 to 203) Nm (0 to 445) Nm (0 to 2405) Nm (0 to 4747) Nm	0.010 % + 0.053 Nm 0.010 % + 0.092 Nm 0.010 % + 1.8 Nm 0.023 % + 8.9 Nm	Class F weights dynamometer Class F weights & moment arm MSI 3360 crane scale
Force – Compression & Tension	(0 to 10 200) lbf (0 to 1000) lbf	0.021 % of full scale 0.031 % of full scale	10.2 k proving ring Load cell

IV. Thermodynamics

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Temperature – Measuring Equipment	(-40 to 100) °C (100 to 200) °C (200 to 300) °C	0.0069 °C 0.0077 °C 0.011 °C	Fluke 1594A & Hart 5628-12 w/ Fluke 7341 oil bath Fluke 1594A & Hart 5628-12 w/ Fluke 6331 oil bath
Temperature – Measuring Equipment, Fixed Points	0.00 °C 0.01 °C 156.63 °C	0.0075 °C 0.0067 °C 0.30 °C	Ice point Hart TPW cell 5901 Reference material indium
PRT	(-40 to 58) °C (58 to 300) °C (30 to 240) °C (240 to 400) °C	0.0069 °C 0.013 °C 0.016 °C 0.028 °C	Fluke 1594A, Fluke 5628 & oil bath Fluke 1594A, Fluke 5628 & dry block
Relative Humidity[3] – Measuring Equipment	(10 to 95) % RH	0.53 % RH	Thunder Scientific 2500
Dew Point – Measuring Equipment	(0 to 50) °C	0.15 °C	Thunder Scientific 2500

V. Time & Frequency

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Frequency – Measure & Measuring Equipment	(0.01 to 120) Hz 120 Hz to 1.2 kHz (1.2 to 12) kHz (12 to 120) kHz 120 kHz to 1.2 MHz (1.2 to 2.0) MHz	0.000 20 Hz 0.0022 Hz 0.021 Hz 0.22 Hz 2.0 Hz 2.8 Hz	Agilent 33250A & PM6690
Time – Measure	(0 to 86 400) s	0.10 s	NIST (303 499 7111)

[1] This laboratory is not normally available for commercial 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] The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification.

[4] In the statement of CMC, percent refers to a percent of reading unless otherwise noted.

[5] 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.

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

Accredited Laboratory

A2LA has accredited

THE LUBRIZOL CORPORATION

Wickliffe, 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 26th day of December 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 2115.01
Valid to November 30, 2025

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