



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

*Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:*

### ***Alternate Systems LLC***

***17440 Dallas Parkway, Suite 210, Dallas, TX 75287***

*(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:*

### **ISO/IEC 17025:2017**

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system  
(as outlined by the joint ISO-ILAC-IAF Communiqué dated 2017):

***Acoustic, Chemical, Dimensional, Electrical, Mass, Force & Weighing Devices,  
Mechanical, Optical, Thermodynamic, and Time and Frequency Calibration  
(As detailed in the supplement)***

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen  
President

Perry Johnson Laboratory  
Accreditation, Inc. (PJLA)  
755 W. Big Beaver, Suite 1325  
Troy, Michigan 48084

*Initial Accreditation Date:*

December 4, 2017

*Issue Date:*

March 19, 2024

*Expiration Date:*

May 31, 2026

*Accreditation No.:*

73642

*Certificate No.:*

L24-222

*The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: [www.pjllabs.com](http://www.pjllabs.com)*



# Certificate of Accreditation: Supplement

## Alternate Systems LLC

17440 Dallas Parkway, Suite 210, Dallas, TX 75287  
 Contact Name: Peter W. Wright Phone: 972-964-3124

Accreditation is granted to the facility to perform the following calibrations:

### Acoustic

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION OR MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Sound Level – Measure (Meters) <sup>FO</sup>	94 dB	0.35 dB	Sound Calibrator	NAVAIR 17-20SA-21

### Chemical

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Ferrite Measuring Instruments <sup>FO</sup>	Up to 9 FN	0.3 FN	NIST SRM's 8480 and 8481	ASTM A799/A799M, ASTM E 1004, AltSys P5040, QM-2 ICRP, OIML D20, NIST Ferrite SRM
	>9 FN to 25 FN	0.5 FN		
	>25 FN to 140 FN	5% FN		
pH Meters, Fixed Points <sup>FO</sup>	4 pH	0.015 pH	pH solutions	SCP-N-002
	7 pH	0.015 pH		
	10 pH	0.015 pH		
XRF Chemical Composition <sup>FO</sup>	Up to 100 WT %	2.1 WT %	Fischerscope X-Ray System	P6010
Conductivity Meters, Fixed Points <sup>FO</sup>	10 $\mu$ s/cm	0.75 $\mu$ s/cm	Conductivity Solutions	SCP-N-002
	100 $\mu$ s/cm	2.5 $\mu$ s/cm		
	1 000 $\mu$ s/cm	5.0 $\mu$ s/cm		
	1 410 $\mu$ s/cm	5.0 $\mu$ s/cm		
	10 000 $\mu$ s/cm	45 $\mu$ s/cm		
	100 000 $\mu$ s/cm	400 $\mu$ s/cm		

### Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION OR MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Micrometers, Dial Indicators <sup>FO</sup>	0.05 in to 8 in	(50.1 + 7.57 x 10 <sup>-2</sup> L) $\mu$ m	Gage Block Set	AltSys P5040, QM-2 ICRP, 33K6-4-15-1, OIML D20
Calipers <sup>FO</sup>	0.05 in to 8 in	(500 + 7.55 x 10 <sup>-3</sup> L) $\mu$ m		
Coating Thickness Standards <sup>FO</sup>	0.000 06 in to 0.5 in	2.4 $\mu$ m	Pratt & Whitney Labmaster LMS200	AltSys P5040, QM-2 ICRP, 33K6-4-15-1, OIML D20
XRF Instruments, Standards and Samples <sup>FO</sup>	0.1 $\mu$ m to 3 000 $\mu$ m	3.7 % Indicated Value	X-Ray Standards, Fischer XDAL, Fischer XDL	AltSys P5040, QM-2 ICRP, ASTM B568, OIML D20, Fischer XDAL- SDD



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Pin Gages <sup>FO</sup>	0.007 8 in to 1.575 in	80 $\mu$ m	Keyence LS-5501 Laser Scan Micrometer	AltSys P5040, QM-2 ICRP, A1000180-7, OIML D20
Gage Blocks <sup>FO</sup>	0.005 in to 8 in	[(2 + 0.5L) + 0.5] $\mu$ m	Pratt & Whitney Labmaster LMS200	QM-2 ICRP, T.O. 33K6-4-1-1, OIML D20
Optical Comparators <sup>FO</sup>	0.010 in to 12 in	51 $\mu$ m	Quality Vision International 425401 Calibration Slide	AltSys P5040, QM-2 ICRP, NAVAIR 17-20MD-63, OIML D20
Surface Plate Electronic Level Repeat Reading <sup>FO</sup>	Up to 108 in DL	0.2 arc second 25 $\mu$ m	Electronic Level Repeat-O-Meter	AltSys P5040, 33K6-4-2696-1
Length <sup>FO</sup>	Up to 1 500 ft	3 ft	Fluke Microscanner2 Cable Verifier	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20

### Electrical

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Equipment for Measuring Alloy Conductivity <sup>FO</sup> Alloy Conductivity Standards <sup>F</sup>	Up to 1% IACS	0.1 % IACS	Conductivity Standard Set, Fischer MMS	AltSys P5040, QM-2 ICRP, ASTM E1004, OIML D20
	>1 % IACS to 7 % IACS	0.15 % IACS		
	>7 % IACS to 17 % IACS	0.2 % IACS		
	>17 % IACS to 30 % IACS	0.35 % IACS		
	>30 % IACS to 60 % IACS	0.4 % IACS		
	>60 % IACS to 104 % IACS	0.5 % IACS		
Equipment to Measure DC Voltage <sup>FO</sup>	2 $\mu$ V to 330 mV	20.3 $\mu$ V/V + 1 $\mu$ V	Fluke 5522A	AltSys P5040, QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
	330 mV to 3.3 V	11 $\mu$ V/V + 2 $\mu$ V		
	3.3 V to 33 V	12 $\mu$ V/V + 20 $\mu$ V		
	33 V to 330 V	18 $\mu$ V/V + 150 $\mu$ V		
	330 V to 1 100 V	18 $\mu$ V/V + 1 500 $\mu$ V		
Fixed point DC Voltage <sup>F</sup>	10V	1.2 $\mu$ V/V	Alternate system voltage reference	Procedure NA17-20AE-126L



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Equipment to Output DC Voltage <sup>FO</sup>	2 $\mu$ V to 100 mV	8 $\mu$ V/V + 0.3 $\mu$ V	Keysight 3458A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
	0.1 V to 1 V	4 $\mu$ V/V + 0.3 $\mu$ V		
	1 V to 10 V	4 $\mu$ V/V + 0.5 $\mu$ V		
	10 V to 100 V	6 $\mu$ V/V + 30 $\mu$ V		
	100 V to 1 000 V	6 $\mu$ V/V + 300 $\mu$ V		
	0.1 kV to 30 kV	2.9 V	Bertan HVD-1, Keysight 3458A	
Equipment to Measure DC Current <sup>FO</sup>	2 $\mu$ A to 330 $\mu$ A	150 $\mu$ A/A + 0.02 $\mu$ A	Fluke 5522A	AltSys P5040, QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
	330 $\mu$ A to 3.3 mA	105 $\mu$ A/A + 0.05 $\mu$ A		
	3.3 mA to 33 mA	100 $\mu$ A/A + 0.25 $\mu$ A		
	33 mA to 330 mA	100 $\mu$ A/A + 2.5 $\mu$ A		
	330 mA to 1.1 A	200 $\mu$ A/A + 40 $\mu$ A		
	1.1 A to 3 A	380 $\mu$ A/A + 40 $\mu$ A		
	3 A to 11 A	500 $\mu$ A/A + 500 $\mu$ A		
	11 A to 20.5 A	1.0 mA/A + 750 $\mu$ A	w/ Fluke 50-turn coil	
Equipment to Output DC Current <sup>FO</sup>	2 nA to 100 nA	20 nA/A + 40 pA	Keysight 3458A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
	100 nA to 1 $\mu$ A	27 $\mu$ A/A + 45 pA		
	1 $\mu$ A to 10 $\mu$ A	27 $\mu$ A/A + 110 pA		
	10 $\mu$ A to 100 $\mu$ A	27 $\mu$ A/A + 900 pA		
	100 $\mu$ A to 1 mA	27 $\mu$ A/A + 6 nA		
	1 mA to 10 mA	27 $\mu$ A/A + 60 nA		
	10 mA to 100 mA	42 $\mu$ A/A + 0.6 $\mu$ A		
	100 mA to 1 A	117 $\mu$ A/A + 12 $\mu$ A		
	21 A to 2 000 A	2% Reading + 15 digits	Fluke 353 Current Clamp	



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Equipment to Measure Resistance <sup>FO</sup>	Up to 11 $\Omega$	40 $\mu\Omega/\Omega$ + 1 m $\Omega$	Fluke 5522A	AltSys P5040, QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
	11 $\Omega$ to 33 $\Omega$	30 $\mu\Omega/\Omega$ + 1.5 m $\Omega$		
	33 $\Omega$ to 110 $\Omega$	28 $\mu\Omega/\Omega$ + 1.4 m $\Omega$		
	110 $\Omega$ to 330 $\Omega$	28 $\mu\Omega/\Omega$ + 2 m $\Omega$		
	330 $\Omega$ to 1.1 k $\Omega$	28 $\mu\Omega/\Omega$ + 2 m $\Omega$		
	1.1 k $\Omega$ to 3.3 k $\Omega$	28 $\mu\Omega/z$ + 20 m $\Omega$		
	3.3 k $\Omega$ to 11k $\Omega$	28 $\mu\Omega/\Omega$ + 20 m $\Omega$		
	11 k $\Omega$ to 33 k $\Omega$	28 $\mu\Omega/\Omega$ + 200 m $\Omega$		
33 k $\Omega$ to 110 k $\Omega$	28 $\mu\Omega/\Omega$ + 200 m $\Omega$			
Equipment to Measure Resistance <sup>FO</sup>	110 k $\Omega$ to 330 k $\Omega$	32 $\mu\Omega/\Omega$ + 2 $\Omega$	Fluke 5522A	AltSys P5040, QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
	330 k $\Omega$ to 1.1 M $\Omega$	32 $\mu\Omega/\Omega$ + 2 $\Omega$		
	1.1 M $\Omega$ to 3.3 M $\Omega$	60 $\mu\Omega/\Omega$ + 30 $\Omega$		
	3.3 M $\Omega$ to 11 M $\Omega$	130 $\mu\Omega/\Omega$ + 50 $\Omega$		
	11 M $\Omega$ to 33 M $\Omega$	250 $\mu\Omega/\Omega$ + 2.5 k $\Omega$		
	33 M $\Omega$ to 110 M $\Omega$	500 $\mu\Omega/\Omega$ + 3 k $\Omega$		
	110 M $\Omega$ to 330 M $\Omega$	0.3 m $\Omega/\Omega$ + 100 k $\Omega$		
	330 M $\Omega$ to 1 100 M $\Omega$	1.5 m $\Omega/\Omega$ + 500 k $\Omega$		
Fixed Point Resistance <sup>FO</sup>	10K $\Omega$	2.4 $\mu\Omega/\Omega$	ZIP P331 10k $\Omega$ resistance standard	Fixed point resistance Procedure, 33K8-4-859-1
Equipment to Output Resistance <sup>FO</sup>	1 $\Omega$ to 10 $\Omega$	21 $\mu\Omega/\Omega$ + 60 $\mu\Omega$	Keysight 3458A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
	10 $\Omega$ to 100 $\Omega$	18 $\mu\Omega/\Omega$ + 0.6 m $\Omega$		
	0.1 k $\Omega$ to 1 k $\Omega$	16 $\mu\Omega/\Omega$ + 0.6 m $\Omega$		
	1 k $\Omega$ to 10 k $\Omega$	16 $\mu\Omega/\Omega$ + 6 m $\Omega$		
	10 k $\Omega$ to 100 k $\Omega$	16 $\mu\Omega/\Omega$ + 60 m $\Omega$		
	0.1 M $\Omega$ to 1 M $\Omega$	21 $\mu\Omega/\Omega$ + 3 $\Omega$		
	1 M $\Omega$ to 10 M $\Omega$	73 $\mu\Omega/\Omega$ + 30 $\Omega$		
	10 M $\Omega$ to 100 M $\Omega$	73 $\mu\Omega/\Omega$ + 30 $\Omega$		
0.1 G $\Omega$ to 1 G $\Omega$	6 m $\Omega/\Omega$ + 3 k $\Omega$			
Equipment to Measure AC Voltage (at the following frequencies) <sup>FO</sup>			Fluke 5522A	AltSys P5040, QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
45 Hz to 10 kHz	1 mV to 330 mV	0.018 % + 8 $\mu$ V		
	0.33 V to 3.3 V	0.018 % + 60 $\mu$ V		
	3.3 V to 33 V	0.017 % + 0.6 mV		



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Equipment to Measure AC Voltage (at the following frequencies) <sup>FO</sup>			Fluke 5522A	AltSys P5040, QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
45 Hz to 1 kHz	33 V to 330 V	0.023 % + 2 mV		
1 kHz to 10 kHz		0.023 % + 6 mV		
45 Hz to 1 kHz	330 V to 1 000 V	0.046 % + 10 mV		
1 kHz to 5 kHz		0.040 % + 10 mV		
Equipment to Output AC Voltage (at the following frequencies) <sup>FO</sup>			Keysight 3458A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
40 Hz to 1 kHz	100 mV to 10 V	0.007 % Reading + 0.006 % Range		
	10 V to 100 V	0.02 % Reading + 0.002 % Range		
	100 V to 1 000 V	0.04 % Reading + 0.002 % Range		
Equipment to Output AC Voltage (at the following frequencies) <sup>FO</sup>			Keysight 3458A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
1 kHz to 20 kHz	100 mV to 10 V	0.014 % Reading + 0.002 % Range		
	10 V to 100 V	0.02 % Reading + 0.002 % Range		
	100 V to 1 000 V	0.06 % Reading + 0.002 % Range		
20 kHz to 50 kHz	100 mV to 10 V	0.03 % Reading + 0.002 % Range		
	10 V to 100 V	0.035 % Reading + 0.002 % Range		
	100 V to 1 000 V	0.12 % Reading + 0.002 % Range		
50 kHz to 100 kHz	100 mV to 10 V	0.08 % Reading + 0.002 % Range		
	10 V to 100 V	0.012 % Reading + 0.002 % Range		
	100 V to 1 000 V	0.3 % Reading + 0.002 % Range		
60 Hz	1 000 V to 25 000 V	5.5 % Reading	Fluke HV Probe and 87-IV	



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Equipment to Measure AC Current (at the following frequencies) <sup>FO</sup>			Fluke 5522A	AltSys P5040, QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
45 Hz to 1 kHz	29 $\mu$ A to 330 $\mu$ A	0.13 % + 0.1 $\mu$ A		
	330 $\mu$ A to 3.3 mA	0.10 % + 0.15 $\mu$ A		
	3.3 mA to 33 mA	0.07 % + 2 $\mu$ A		
	33 mA to 330 mA	0.083 % + 20 $\mu$ A		
	0.33 A to 3 A	0.10 % + 100 $\mu$ A		
	3 A to 10 A	0.21 % + 2 mA		
	10 A to 20 A	0.21 % + 5 mA		
45 Hz to 440 Hz	16 A to 150 A	1 % + 0.25 A	w/ Fluke 50-turn coil	
	150 A to 1 000 A	1 % + 0.9 A		
Equipment to Output AC Current (at the following frequencies) <sup>FO</sup>			Keysight 3458A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
45 Hz to 5 kHz	100 $\mu$ A to 1 mA	0.3 $\mu$ A		
	1 mA to 10 mA	20 $\mu$ A		
	10 mA to 100 mA	0.2 mA		
	100 mA to 1 A	2.1 mA		
Equipment to Output AC Current (at the following frequencies) <sup>FO</sup>			Fluke 353 Current Clamp	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
10 Hz to 100 Hz	10 A to 1 400 A	2 % Reading + 15 digits		
100 Hz to 1 kHz		4 % Reading + 15 digits		
Equipment to Output RF Power (at the following frequencies) <sup>FO</sup>			HP 437B & 8482A HP 437B & 8481D	AltSys P5040, NAVAIR 17-20AF-166
100 kHz to 4.2 GHz	-30 dBm to +20 dBm	1.2 dBm		
100 MHz to 18 GHz	-70 dBm to -20 dBm	1.2 dBm		
Equipment to Measure Capacitance <sup>FO</sup>			Fluke 5522A	QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
	0.19 nF to 0.39 nF	5 mF/F + 0.01 nF		
	0.4 nF to 1.09 nF	2 mF/F + 0.01 nF		
	1.1 nF to 3.29 nF	1 mF/F + 0.01 nF		
	3.3 nF to 10.9 nF	1 mF/F + 0.01 nF		
	11 nF to 32.9 nF	1 mF/F + 0.1 nF		
	33 nF to 109.9 nF	1 mF/F + 0.1 nF		
	110 nF to 329.9 nF	1 mF/F + 0.3 nF		
	0.33 $\mu$ F to 1.09 $\mu$ F	1 mF/F + 1 nF		



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Equipment to Measure Capacitance <sup>FO</sup>	1.1 $\mu$ F to 3.29 $\mu$ F	1 mF/F + 3 nF	Fluke 5522A	QM-2 ICRP, NA17-20AQ-387, NA17-20AW-526, OIML D20
	3.3 $\mu$ F to 10.9 $\mu$ F	1 mF/F + 10 nF		
	11 $\mu$ F to 32.9 $\mu$ F	1 mF/F + 30 nF		
	33 $\mu$ F to 109.9 $\mu$ F	1 mF/F + 100 nF		
	110 $\mu$ F to 329.9 $\mu$ F	1 mF/F + 300 nF		
	0.33 $\mu$ F to 1.09 mF	1 mF/F + 1 $\mu$ F		
	1.1 mF to 3.29 mF	1 mF/F + 3 $\mu$ F		
	3.3 mF to 10.9 mF	1 mF/F + 10 $\mu$ F		
	11 mF to 32.9 mF	1 mF/F + 30 $\mu$ F		
	33 mF to 110 mF	1 mF/F + 100 $\mu$ F		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type E <sup>FO</sup>	-210 $^{\circ}$ C to -100 $^{\circ}$ C	0.5 $^{\circ}$ C	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML G08, OIML D20	
	-100 $^{\circ}$ C to 650 $^{\circ}$ C	0.16 $^{\circ}$ C		
	650 $^{\circ}$ C to 1 000 $^{\circ}$ C	0.21 $^{\circ}$ C		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-210 $^{\circ}$ C to -100 $^{\circ}$ C	0.27 $^{\circ}$ C		
	-100 $^{\circ}$ C to 760 $^{\circ}$ C	0.16 $^{\circ}$ C		
	760 $^{\circ}$ C to 1 200 $^{\circ}$ C	0.23 $^{\circ}$ C		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type K <sup>FO</sup>	-200 $^{\circ}$ C to -100 $^{\circ}$ C	0.33 $^{\circ}$ C		
	-100 $^{\circ}$ C to 120 $^{\circ}$ C	0.18 $^{\circ}$ C		
	120 $^{\circ}$ C to 1 000 $^{\circ}$ C	0.26 $^{\circ}$ C		
	1 000 $^{\circ}$ C to 1 372 $^{\circ}$ C	0.40 $^{\circ}$ C		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type N <sup>FO</sup>	-100 $^{\circ}$ C to 120 $^{\circ}$ C	0.17 $^{\circ}$ C		
	120 $^{\circ}$ C to 410 $^{\circ}$ C	0.14 $^{\circ}$ C		
	410 $^{\circ}$ C to 1 300 $^{\circ}$ C	0.21 $^{\circ}$ C		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type B <sup>FO</sup>	600 $^{\circ}$ C to 1 000 $^{\circ}$ C	0.42 $^{\circ}$ C		
	1 000 $^{\circ}$ C to 1 820 $^{\circ}$ C	0.3 $^{\circ}$ C		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type C <sup>FO</sup>	0 $^{\circ}$ C to 1 000 $^{\circ}$ C	0.23 $^{\circ}$ C		
	1 000 $^{\circ}$ C to 1 800 $^{\circ}$ C	0.38 $^{\circ}$ C		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type R <sup>FO</sup>	0 $^{\circ}$ C to 250 $^{\circ}$ C	0.57 $^{\circ}$ C		
	250 $^{\circ}$ C to 1 000 $^{\circ}$ C	0.35 $^{\circ}$ C		
	1 000 $^{\circ}$ C to 1 767 $^{\circ}$ C	0.40 $^{\circ}$ C		





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Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type S <sup>FO</sup>	0 °C to 250 °C	0.47 °C	Fluke 5522A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML G08, OIML D20
	250 °C to 1 400 °C	0.37 °C		
	1 400 °C to 1 767 °C	0.46 °C		
Temperature Calibration, Indications, and Control Equipment used with Thermocouple Type T <sup>FO</sup>	-200 °C to -150 °C	0.63 °C		
	-150 °C to 0 °C	0.24 °C		
	0 °C to 400 °C	0.16 °C		
Temperature Calibration Equipment to Measure RTD Type Pt385, 100 $\Omega$ <sup>FO</sup>	-200 °C to 0 °C	0.05 °C		
	0 °C to 630 °C	0.12 °C		
	630 °C to 800 °C	0.23 °C		
Oscilloscope			Fluke 5522A SC 1100 and HP 8648C	EURAMET cg-7
Square Wave 1 M $\Omega$ , 100 Hz	1 mV to 150 V(p-p)	40 $\mu$ V + 0.2 % of Rdg		
Square Wave 50 $\Omega$ , 1 kHz	1 mV to 6.6 V(p-p)	40 $\mu$ V + 0.35 % of Rdg		
Time Marker Output into 50 $\Omega$	1 ns to 20 ms	5 $\mu$ s/s		
Rise Time	$\leq$ 300 ps	(0/ps / - 100) ps		
Level Sine Flatness 5 mV to 5.5 V to 50 kHz Reference to 100 kHz Reference	50 kHz to 100 MHz 100 MHz to 300 MHz 300 MHz to 600 MHz 600 MHz to 1 200 MHz 1 200 MHz to 3 000 MHz	0.1mV + 0.1 % of Reading 0.1mV + 2.5 % of Reading 0.1mV + 4.5 % of Reading 0.1mV + 5.5 % of Reading 0.2mV + 5.5 % of Reading		



# Certificate of Accreditation: Supplement

## Alternate Systems LLC

17440 Dallas Parkway, Suite 210, Dallas, TX 75287  
 Contact Name: Peter W. Wright Phone: 972-964-3124

Accreditation is granted to the facility to perform the following calibrations:

### Mass, Force, and Weighing Devices

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION OR MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Bench and Floor Scales <sup>FO</sup>	5 lb to 2 500 lb	$(-2.7 \times 10^{-2} + 1.06 \times 10^{-5} \text{ Wt}) \text{ lb}$	Class F Weight Set	AltSys P5040, QM-2 ICRP, NIST Handbook 44, OIML D20
Laboratory Balances <sup>FO</sup>	0.5 g	1 mg	Metric Weight Set Class 1	AltSys P5040, QM-2 ICRP, NISTIR 6919, OIML D20
	1 g			
	100 g			
	200 g			
	4 000 g			
Hydraulic Press <sup>O</sup>	100 000 lb	1 200 lb	Force Gage	17-20MP-41
Durometer Spring Force Only <sup>FO</sup>	Types A, B, C, D, DO, E	0.6 Duro	Balance and Weights	ASTM D2240

### Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION OR MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Pressure Gauges <sup>FO</sup>	-15 psi to 30 psi	0.009 psi	Additel ADT685	AltSys P5040, QM-2 ICRP, T.O. 33K6-4-427-1, OIML D20
	> 30 psi to 200 psi	0.09 psi	Fluke 743B, Fluke 700PD7	
	> 200 psi to 5 000 psi	0.05 % Reading	Additel ADT686	
Rockwell Hardness <sup>FO</sup>	< 81 HR15TW	0.6 HR15TW	Hardness Blocks	ASTM E18-22
	$\geq$ 81 HR15TW to < 87 HR15TW	0.6 HR15TW		
	$\geq$ 87 HR15TW	0.6 HR15TW		
	< 60 HRBW	0.5 HRBW		
	$\geq$ 60 HRBW to < 88 HRBW	0.4 HRBW		



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### Mechanical

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Rockwell Hardness <sup>FO</sup>	$\geq 88$ HRBW	0.4 HRBW	Hardness Blocks	ASTM E18-22
	$< 78$ HR15N	0.3 HR15N		
	$\geq 78$ HR15N to $< 90$ HR15N	0.3 HR15N		
	$\geq 90$ HR15N	0.3 HR15N		
	$< 55$ HR30N	0.3 HR30N		
	$\geq 55$ HR30N to $< 90$ HR30N	0.3 HR30N		
	$\geq 90$ HR30N	0.3 HR30N		
	$< 37$ HR45N	0.3 HR45N		
	$\geq 37$ HR45N to $< 66$ HR45N	0.3 HR45N		
	$\geq 66$ HR45N	0.3 HR45N		
	$< 84$ HREW	0.3 HREW		
	$\geq 84$ HREW to $< 93$ HREW	0.3 HREW		
	$\geq 93$ HREW	0.3 HREW		
	$< 35$ HRC	0.4 HRC		
	$\geq 35$ HRC to $< 60$ HRC	0.5 HRC		
	$\geq 60$ HRC	0.4 HRC		
Torque – Measure <sup>FO</sup>	2 in-lbf to 250 in-lbf	0.6% Reading	Torque Standard	33K6-4-3014-1
	25 ft-lbf to 250 ft-lbf	0.6% Reading		
Torque - Source <sup>FO</sup>	4 in-lbf to 200 in-lbf	0.2 in-lbf	Torque Wheel, Weights	33K6-4-3014-1
Equipment for Measuring Coating Thickness <sup>FO</sup>	Up to 10 mils	0.002 4 mils	Coating Thickness Foil Set	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
	10 mils to 600 mils	0.05 mils		
Air Velocity <sup>F</sup>	100 FPM to 3 000 FPM	1.2 % of Reading	Wind Tunnel, Air Velocity Meter	33K6-4-1769-1
Gauss <sup>F</sup>	2 G to 85 G	0.2 G	Helmholtz Coil	33K1-4-1336-1



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### Optical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION OR MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Gloss Meters	20°, 60°, 85°	0.8 GU	Gloss Standards and Gloss Meter	SOP CP-Gloss
Loss <sup>FO</sup>	+10 to -52 dBm at 850 nm +10 to -60 dBm at 1 300 nm	0.3 dB	Fluke Networks SimpliFiber Pro Optical Power Meter, 850/1300 Multimode Source	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
Power <sup>FO</sup>	+10 to -52 dBm at 850 nm +10 to -60 dBm at 1 300 nm	0.3 dB	Fluke Networks SimpliFiber Pro Optical Power Meter, 850/1300 Multimode Source	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
Visible light – Measure <sup>FO</sup>	1 fc to 500 fc	6%	Extech 401025	33K4-4-475-1

### Thermodynamic

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION OR MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Measure Temperature <sup>FO</sup> Thermometers Ovens, RTD, Thermocouples	-200 °C to 420 °C	0.04 °C	Fluke 5615, Fluke 9142	AltSys P5040, QM-2 ICRP, NIST SP250-23, T.O. 33K5-4-28-1, NA17-20ST-03, ASTM E2623-14, OIML D20
Source Temperature <sup>FO</sup>	-25 °C to 150 °C	0.04 °C		
IR Thermometers <sup>FO</sup>	Ambient – 212 °F	2.1 °F	Fluke 9131 HDRC, Fluke 1586A	AltSys P5040, QM-2 ICRP, Operator's Manual, OIML D20
	212 °F to 392 °F	4.1 °F		
	392 °F to 482 °F	4.1 °F		
	482 °F to 572 °F	6.1 °F		
	572 °F to 752 °F	6.1 °F		
Relative Humidity <sup>FO</sup> Source and Measure	5 % RH to 90 % RH	0.6%	Saturated Salt Solutions, Rotronic HC2-S	NA 17-20MH-27 NA 17-20MH-33 OIML R-121



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Accreditation is granted to the facility to perform the following calibrations:

### Time and Frequency

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION OR MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED	CALIBRATION MEASUREMENT METHOD OR PROCEDURES USED
Frequency – Measure <sup>FO</sup>	$\leq$ 2GHz	2.5 parts x 10 <sup>8</sup>	BK Precision 1823A,	NA 17-20GG-188, NA 17-20AF-11
Source <sup>FO</sup>	$\leq$ 3GHz	2.5 parts x 10 <sup>-8</sup>	Hewlett Packard 8648C	NA 17-20GG-188, NA 17-20AF-11
Reference fixed point Frequency Measure <sup>F</sup>	5 MHz 10 MHz	1 part x 10 <sup>-11</sup>	GPS Receiver-Turn Dynamic TM5301A	NA 17-20GG-188, NA 17-20AF-11
Stopwatch/Timer <sup>FO</sup>	6 000 s	0.6 s	BK Precision 1823A,	FCP-16
Tachometer <sup>FO</sup>	10 to 10 000 RPM	0.1 % Reading	Monarch PLT200, TO	33 K4-4-475-1

1. The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represents the smallest measurement uncertainty attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is typically expressed at a confidence level of 95 % using a coverage factor  $k$  (usually equal to 2). The actual measurement uncertainty associated with a specific calibration performed by the laboratory will typically be larger than the CMC for the same calibration since capability and performance of the device being calibrated and the conditions related to the calibration may reasonably be expected to deviate from ideal to some degree.
2. The laboratories range of calibration capability for all disciplines for which they are accredited is the interval from the smallest calibrated standard to the largest calibrated standard used in performing the calibration. The low end of this range must be an attainable value for which the laboratory has or has access to the standard referenced. Verification of an indicated value of zero in the absence of a standard is common practice in the procedure for many calibrations but by its definition it does not constitute calibration of zero capacity.
3. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location.
4. The presence of a superscript O means that the laboratory performs calibration of the indicated parameter onsite at customer locations.
5. Measurement uncertainties obtained for calibrations performed at customer sites can be expected to be larger than the measurement uncertainties obtained at the laboratories fixed location for similar calibrations. This is due to the effects of transportation of the standards and equipment and upon environmental conditions at the customer site which are typically not controlled as closely as at the laboratories fixed location.
6. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
7. The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.