



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

CMM Calibration and Services
3419 Lonergan Drive, Rockford, IL 61109

(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 April 2017):

***Calibration of Dimensional, Electrical, Mechanical, Thermodynamic
Mass, Force & Weighing Devices***
(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/Operations Manager

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

<i>Initial Accreditation Date:</i>	<i>Issue Date:</i>	<i>Expiration Date:</i>
October 27, 2002	March 28, 2019	July 31, 2021

<i>Accreditation No.:</i>	<i>Certificate No.:</i>
59085	L19-174

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



Certificate of Accreditation: Supplement

CMM Calibration and Services

3419 Lonergan Drive, Rockford, IL 61109
 Contact Name: Kim Kirkpatrick Phone: 815-227-4266

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

Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
1, 2, 3 Blocks ^F	1 in to 3 in	(40 + 2.7L) μ m	Gage Blocks, Surface Plate, Electronic Amp And Height Gage T.O. 33K6-4-731-1
Angle Gage Blocks ^F	1/4° to 45°	0.008°	Angle Blocks/Sine Plate, Electronic Amp, and Surface Plate NAVAIR 17-20 MD-78
Calipers ^{FO}	0.001 in to 72 in	(397.8 + 30.2L) μ m	Gage Blocks, Cylindrical Rings And Surface Plate T.O. 33K6-4-552-1
Caliper Checker ^{FO}	1 in to 72 in	(14 + 6L) μ m	Gage Blocks, Electronic Amp And Surface Plate T.O. 33K6-4-1184-1
CMM Calibration and Inspection Volumetric Performance ^{FO}	(16 in to 40 in) 80 % of CMM Shortest Axis for Ball Bar Length	150 μ m	Ball Bar and Step Gage, Gage Blocks, Laser, ASME B89.4.1 ISO10360
(CNC) CMM Linear Displacement Accuracy ^O	X: 0.001 m to 80 m Y: 0.001 m to 80 m Z: 0.001 m to 80 m	(1 + 1.9L) μ m	Laser, Gage Blocks, Step Gage, ASME B89.4.1, ISO10360
Dial Bore Gage ^F	0.14 in to 10 in	(103 + 35L) μ m	Gage Blocks With Accessories And UMM/Bench Mic T.O. 33K6-4-992-1
Dial Indicator Calibrator ^F	0.005 in to 1 in	(40 + 2L) μ m	Surface Plate, Electronic Indicator, Gage Blocks And Optical Flat TO 33K6-4-2072-1
Dial Sink/Counterbore Gage ^{FO}	0.1 in to 1 in	180 μ m	Gage Blocks, Surface Plate, Ring Gage T.O. 33K6-4-2732-1
Gage Ball ^F	0.05 in to 1 in	22 μ m	UMM/Bench Mic, Gage Blocks T.O. 33K6-4-1181-1
Gage Blocks, Steel Gage Blocks, TC/CC/Ceramic ^F	0.005 in to 4 in	(4.4 + 1L) μ m	Labmaster/Mahr UMM, Gage Blocks, Optical Flat Temperature And Humidity Data Logger NAVAIR 17-20MD-185
	5 in to 10 in	(9 + 5L) μ m	
	12 in to 20 in	(17 + 5L) μ m	



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Granite Surface Plates Flatness ^{FO}	12 in to 36 in Diagonal	47 μ in	Planeator, Autocollimator And Repeat Reading Gage T.O. 33K6-4-33-1
	36 in to 54 in Diagonal	55 μ in	
Height Gage ^{FO}	0.05 in to 4 in	580 μ in	Gage Blocks, Surface Plate And repeat Reading Gage T.O. 33K6-4-1626-1
	4 in to 36 in	610 μ in	
Height Master ^F	0.5 in to 48 in	(86 + 5L) μ in	Electronic Amp, Gage Blocks, Master Level NAVAIR 17-20MD-26
Indicator ^{FO}	0.001 in to 1 in	70 μ in	Indicator Calibrator T.O. 33K6-4-889-1
	0.000 15 in to 4 in	590 μ in	UMM/Bench Mic, Gage Blocks And Surface Plate T.O. 33K6-4-889-1
Inside Micrometer ^F	1.5 in to 60 in	(110 + 21L) μ in	Gage Blocks, UMM/Bench Mic, V-Block, Angle Plate And Optical Flat NAVAIR 17-20-MD-09
Intramic/Bore Mic ^{FO}	0.2 in to 6 in	(95 + 5L) μ in	Master Setting Rings Rings And Surface Plate NAVAIT 17-20MD-142
Kalmaster ^F	0.3 in to 12 in	(42 + 5L) μ in	Gage Blocks, Electronic Amp And Surface Plate T.O. 33K6-4-1184-1
Length Standards ^F	1 in to 60 in	(33 + 2.2L) μ in	UMM/Bench Mic, Gage Blocks, Surface Plate, V-Blocks And Electronic Amp NAVAIR 17-20MD-76
Levels ^F	14 in Maximum	150 μ in	Gage Blocks, Granite Surface Plate, Master Level, Straight Edge, Indicator, Height Gage And Sine Plate NAVAIR 17-20MD-10
Mic Master, OD ^F	0.5 in to 10 in	(28 + 5L) μ in	Gage Blocks, Electronic Amp, Electronic Height Gage And Surface Plate T.O. 33K6-4-1183-1



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Micrometer Head ^F	0.05 in to 1 in	(57 + 9L) μ in	Gage Blocks, Optical Flat, Surface Plate And V-Block T.O. 33K6-4-15-1
Micrometer, OD ^{FO}	0.05 in to 24 in	(57 + 5.3L) μ in	Gage Blocks, Optical Flat, Surface Plate And V-Block T.O. 33K6-4-15-1
Optical Comparators Linear ^{FO}	12 in Maximum	350 μ in	Glass Artifact, Stage Fixture, Test Indicator, And Steel Square NAVAIR 17-20MD-63
Optical Comparators Angular ^{FO}	1° to 360°	0.1°	Glass Artifact And Steel Rule NAVAIR 17-20MD-63
Optical Comparators Magnification ^{FO}	10X	0.04 %	Magnification Checker NAVAIR 17-20MD-63
	20X	0.025 %	
	50X	0.015 %	
Parallel ^{sF}	1 in to 48 in	(35 + 4L) μ in	Gage Blocks, Electronic Amp, Electronic Height Gage, Angle Plate, Repeat Reading Gage and Surface Plate T.O. 33K6-4-731-1
Plain Ring Gages ^{FO}	0.01 in to 10 in	(3.3 + 6.4L) μ in	UMM/ID Comparator Gage Block Set, Gage Block Accessory Kit And Plain Ring Gage T.O. 33K6-4-2-1
Plain Plug Gages ^O	0.04 in to 14 in	(28 + 5L) μ in	Umm/Bench Mic and Gage Blocks NAVAIR 17-20MD-39
Protractor ^F	1/4° to 90°	0.1°	Angle Blocks
Radius Gages ^F	0.01 in to 1 in	750 μ in	Optical Comparator B-I006P153



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Repeat-o-Meter ^F	0.002 in	33 μ in	Indicator Calibrator, Gage Blocks, Surface Plate And UMM/Bench Mic, T.O. 33K6-4-889-1
Sine Bar/Plate ^F	2 in to 10 in	230 μ in	Gage Blocks, Electronic Amp, Height Gage, Indicator, Angle Blocks, Repeat Reading Gage and Surface Plate T.O. 33K6-4-120-1
Steel Rule ^F	72 in	0.027 in	Caliper, Stage Micrometer and Surface Plate CPOO266
Bench mic ^{FO}	0.001 in to 10 in	(29 + 4.7L) μ in	Gage Blocks, Force Gage, Optical Parallel, Precision Sphere T.O. 33K6-4-981-1
Surface Finish R _a ^{FO}	10 μ in to 120 μ in	2.9 μ in	Surface Finish Analyzer INT-19.3/NISTIR 89-4088
Squares ^{FO}	12 in Maximum	470 μ in	Indy Square, Master Square, Surface Plate, Gage Block, Height Gage and Electronic Amp T.O. 33K6-4-157-1
	12 in to 24 in	860 μ in	
Taper Thread Ring Pitch Diameter ^F	1/8-27 to 2 1/2-11	380 μ in	Master Taper Plug, Gage Blocks Electronic Amplifier, Height Gage, Indicator, Surface Plate And Optical Comparator NAVAIR 17-20MD-149
	1/8-27 to 4-8	240 μ in	
Thickness /Feeler Gages ^{FO}	0.001 in to 1 in	(62 + 28L) μ in	UMM/Bench Mic Gage Blocks, Surface Plate, Indicator NAVAIR 17-20MD-15



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Thread Measuring Wires ^{FO}	0.005 in to 0.25 in	(19 + 8D) μ m	UMM/Bench Mic, Gage Blocks, Plug Gage T.O. 33K-4-119-1
Thread Plug Gages Pitch Diameter ^F	0-80 to 6 1/4-16	(95.82 + 7.42L) μ m	UMM/Bench Mic, Gage Blocks, Optical Comparator, Electronic Amp And Thread Measuring Wires NAVAIR 17-20-MD-141
Thread Ring Gages ^{FO}	0-80 to 2 1/2-12	(95.82 + 7.52L) μ m	Truncated Thread Setting Plug, Plug Gage, V-Block, Electronic Amp And Surface Plate NAVAIR 17-20MD-143
V Blocks ^{FO}	1 in to 8 in	(46 + 6L) μ m	Gage Block With Accessories, Electronic Amp, Surface Plate, Height Gage, Plug Gage, And Angle Plate. T.O. 33K6-4-553-1

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			Fluke 5520A/SC600 Gidep/OEM
10 Hz to 45 Hz	1 mV to 32.999 mV	6 μ V + 0.08 % of reading	
45 Hz to 10 kHz	1 mV to 32.999 mV	6 μ V + 0.015 % of reading	
10 kHz to 20 kHz	1 mV to 32.999 mV	6 μ V + 0.02 % of reading	
20 kHz to 50 kHz	1 mV to 32.999 mV	6 μ V + 0.1 % of reading	
50 kHz to 100 kHz	1 mV to 32.999 mV	12 μ V + 0.35 % of reading	
100 kHz to 500 kHz	1 mV to 32.999 mV	50 μ V + 0.8 % of reading	



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Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			Fluke 5520A/SC600 Gidep/OEM
10 Hz to 45 Hz	33 mV to 329.999 mV	8 μ V + 0.03 % of reading	
45 Hz to 10 kHz	33 mV to 329.999 mV	8 μ V + 0.014 5 % of reading	
10 kHz to 20 kHz	33 mV to 329.999 mV	8 μ V + 0.016 % of reading	
20 kHz to 50 kHz	33 mV to 329.999 mV	8 μ V + 0.035 % of reading	
50 kHz to 100 kHz	33 mV to 329.999 mV	32 μ V + 0.08 % of reading	
100 kHz to 500 kHz	33 mV to 329.999 mV	70 μ V + 0.2 % of reading	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			
10 Hz to 45 Hz	0.33 V to 3.299 V	50 μ V + 0.03 % of reading	
45 Hz to 10 kHz	0.33 V to 3.299 V	60 μ V + 0.015 % of reading	
10 kHz to 20 kHz	0.33 V to 3.299 V	60 μ V + 0.019 % of reading	
20 kHz to 50 kHz	0.33 V to 3.299 V	50 μ V + 0.03 % of reading	
50 kHz to 100 kHz	0.33 V to 3.299 V	125 μ V + 0.07 % of reading	
100 kHz to 500 kHz	0.33 V to 3.299 V	600 μ V + 0.24 % of reading	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			
10 Hz to 45 Hz	3.3 V to 32.999 V	650 μ V + 0.03 % of reading	
45 Hz to 10 kHz	3.3 V to 32.999 V	650 μ V + 0.015 % of reading	
10 kHz to 20 kHz	3.3 V to 32.999 V	650 μ V + 0.024 % of reading	
20 kHz to 50 kHz	3.3 V to 32.999 V	650 μ V + 0.035 % of reading	
50 kHz to 100 kHz	3.3 V to 32.999 V	1 600 μ V + 0.09 % of reading	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			
45 Hz to 1 kHz	33 V to 329.999 V	2 000 μ V + 0.015 % of reading	
1 kHz to 10 kHz	33 V to 329.999 V	6 000 μ V + 0.02 % of reading	
10 kHz to 20 kHz	33 V to 329.999 V	6 000 μ V + 0.025 % of reading	
20 kHz to 50 kHz	33 V to 329.999 V	6 000 μ V + 0.03 % of reading	
50 kHz to 100 kHz	33 V to 329.999 V	50 000 μ V + 0.2 % of reading	
Equipment to Measure AC Voltage (at the listed frequencies) ^{FO}			
45 Hz to 1 kHz	300 V to 1 020 V	10 000 μ V + 0.03 % of reading	
1 kHz to 5 kHz	300 V to 1 020 V	10 000 μ V + 0.025 % of reading	
5 kHz to 10 kHz	300 V to 1 020 V	10 000 μ V + 0.03 % of reading	



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Equipment to Measure AC Current (at the listed frequencies) ^{F0}			Fluke 5520A/SC600 Gidep/OEM
10 Hz to 20 Hz	29 μ A to 329.99 μ A	0.1 μ A + 0.2 % of reading	
20 Hz to 45 Hz	29 μ A to 329.99 μ A	0.1 μ A + 0.15 % of reading	
45 Hz to 1 kHz	29 μ A to 329.99 μ A	0.1 μ A + 0.125 % of reading	
1 kHz to 5 kHz	29 μ A to 329.99 μ A	0.15 μ A + 0.3 % of reading	
5 kHz to 10 kHz	29 μ A to 329.99 μ A	0.2 μ A + 0.8 % of reading	
10 kHz to 30 kHz	29 μ A to 329.99 μ A	0.4 μ A + 1.6 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
10 Hz to 20 Hz	0.33 mA to 3.299 mA	0.15 μ A + 0.2 % of reading	
20 Hz to 45 Hz	0.33 mA to 3.299 mA	0.15 μ A + 0.125 % of reading	
45 Hz to 1 kHz	0.33 mA to 3.299 mA	0.15 μ A + 0.1 % of reading	
1 kHz to 5 kHz	0.33 mA to 3.299 mA	0.2 μ A + 0.2 % of reading	
5 kHz to 10 kHz	0.33 mA to 3.299 mA	0.3 μ A + 0.5 % of reading	
10 kHz to 30 kHz	0.33 mA to 3.299 mA	0.6 μ A + 1 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
10 Hz to 20 Hz	3.3 mA to 32.999 mA	2 μ A + 0.18 % of reading	
20 Hz to 45 Hz	3.3 mA to 32.999 mA	2 μ A + 0.09 % of reading	
45 Hz to 1 kHz	3.3 mA to 32.999 mA	2 μ A + 0.04 % of reading	
1 kHz to 5 kHz	3.3 mA to 32.999 mA	2 μ A + 0.08 % of reading	
5 kHz to 10 kHz	3.3 mA to 32.999 mA	3 μ A + 0.2 % of reading	
10 kHz to 30 kHz	3.3 mA to 32.999 mA	4 μ A + 0.4 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
10 Hz to 20 Hz	33 mA to 329.999 mA	20 μ A + 0.18 % of reading	
20 Hz to 45 Hz	33 mA to 329.999 mA	20 μ A + 0.09 % of reading	
45 Hz to 1 kHz	33 mA to 329.999 mA	20 μ A + 0.04 % of reading	
1 kHz to 5 kHz	33 mA to 329.999 mA	50 μ A + 0.1 % of reading	
5 kHz to 10 kHz	33 mA to 329.999 mA	100 μ A + 0.2 % of reading	
10 kHz to 30 kHz	33 mA to 329.999 mA	200 μ A + 0.4 % of reading	



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Equipment to Measure AC Current (at the listed frequencies) ^{F0}			Fluke 5520A/SC600 Gidep/OEM
10 Hz to 45 Hz	0.33 A to 1.099 99 A	100 μ A + 0.18 % of reading	
45 Hz to 1 kHz	0.33 A to 1.099 99 A	100 μ A + 0.05 % of reading	
1 kHz to 5 kHz	0.33 A to 1.099 99 A	1 000 μ A + 0.6 % of reading	
5 kHz to 10 kHz	0.33 A to 1.099 99 A	5 000 μ A + 2.5 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
10 Hz to 45 Hz	1.1 A to 2.999 99 A	100 μ A + 0.18 % of reading	
45 Hz to 1 kHz	1.1 A to 2.999 99 A	100 μ A + 0.06 % of reading	
1 kHz to 5 kHz	1.1 A to 2.999 99 A	1 000 μ A + 0.6 % of reading	
5 kHz to 10 kHz	1.1 A to 2.999 99 A	5 000 μ A + 2.5 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
45 Hz to 100 Hz	3 A to 10.999 A	2 000 μ A + 0.06 % of reading	
100 Hz to 1 kHz	3 A to 10.999 A	2 000 μ A + 0.1 % of reading	
1 kHz to 5 kHz	3 A to 10.999 A	2 000 μ A + 3 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
45 Hz to 100 Hz	11 A to 20.5 A	5 000 μ A + 0.12 % of reading	
100 Hz to 1 kHz	11 A to 20.5 A	5 000 μ A + 0.15 % of reading	
1 kHz to 5 kHz	11 A to 20.5 A	5 000 μ A + 3 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
10 Hz to 100 Hz	29 μ A to 329 99 μ A	0.2 μ A + 0.25 % of reading	
100 Hz to 1 kHz	29 μ A to 329 99 μ A	0.5 μ A + 0.6 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
10 Hz to 100 Hz	0.33 mA to 3.299 9 mA	0.3 μ A + 0.25 % of reading	
100 Hz to 1 kHz	0.33 mA to 3.299 9 mA	0.8 μ A + 0.6 % of reading	
500 Hz to 1 kHz	0.33 mA to 3.299 9 mA	0.15 μ A + 0.1 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{F0}			
10 Hz to 100 Hz	33 mA to 329.99 mA	40 μ A + 0.08 % of reading	
100 Hz to 1 kHz	33 mA to 329.99 mA	100 μ A + 0.2 % of reading	



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Equipment to Measure AC Current (at the listed frequencies) ^{FO}			Fluke 5520A/SC600 Gidep/OEM
10 Hz to 100 Hz	33 mA to 329.99 mA	200 μ A + 0.12 % of reading	
100 Hz to 440 Hz	33 mA to 329.99 mA	1 000 μ A + 0.3 % of reading	
Equipment to Measure AC Current (at the listed frequencies) ^{FO}			
10 Hz to 100 Hz	3 A to 20.5 A	2 000 μ A + 0.12 % of reading	
100 Hz to 1 kHz	3 A to 20.5 A	5 000 μ A + 1 % of reading	
Equipment to Measure DC Voltage ^{FO}			
	3 μ V to 329.999 9 mV	1 μ V + 0.002 % of reading	
	6 μ V to 3.299 99 V	2 μ V + 0.001 1 % of reading	
	60 μ V to 32.999 9 V	20 μ V + 0.001 2 % of reading	
	30 V to 329.999 9 V	150 μ V + 0.001 8 % of reading	
	100 V to 1.02 kV	1 500 μ V + 0.001 8 % of reading	
Equipment to Measure DC Current ^{FO}			
	0.006 μ A to 329.999 μ A	0.002 μ A + 0.015 % of reading	
	0.015 μ A to 32.999 9 mA	0.005 μ A + 0.01 % of reading	
	0.075 μ A to 329.999 mA	0.025 μ A + 0.01 % of reading	
	7.5 μ A to 329.999 mA	2.5 μ A + 0.01 % of reading	
	120.1 μ A to 1.099 99 A	40 μ A + 0.02 % of reading	
	1.1 A to 2.999 99 A	40 μ A + 0.038 % of reading	
	1.5 mA to 10.999 99 A	500 μ A + 0.05 % of reading	
	11 A to 20.5 A	750 μ A + 0.1 % of reading	
Equipment to Measure Capacitance ^{FO}			
	0.19 nF to 0.399 9 nF	0.01 nF + 0.5 % of reading	
	0.4 nF to 1.099 9 nF	0.01 nF + 0.5 % of reading	
	1.1 nF to 3.299 9 nF	0.01 nF + 0.5 % of reading	
	3.3 nF to 10.999 nF	0.01 nF + 0.25 % of reading	
	11 nF to 32.999 nF	0.1 nF + 0.25 % of reading	
	33 nF to 109.99 nF	0.1 nF + 0.25 % of reading	
	110 nF to 329.99 nF	0.3 nF + 0.25 % of reading	
	0.33 μ F to 1.099 99 μ F	1 nF + 0.25 % of reading	
	1.1 μ F to 3.299 99 μ F	3 nF + 0.25 % of reading	



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Equipment to Measure Capacitance ^{FO}	3.3 μ F to 10.999 9 μ F	10 nF + 0.25 % of reading	Fluke 5520A/SC600 Gidep/OEM
	11 μ F to 32.999 9 μ F	30 nF + 0.4 % of reading	
	33 μ F to 109.999 μ F	100 nF + 0.45 % of reading	
	110 μ F to 329.999 μ F	300 nF + 0.45 % of reading	
	0.33 μ F to 1.099 99 mF	1 μ F + 0.45 % of reading	
	1.1 mF to 3.299 9 mF	3 μ F + 0.45 % of reading	
	3.3 mF to 10.999 9 mF	10 μ F + 0.45 % of reading	
	11 mF to 32.999 mF	30 μ F + 0.75 % of reading	
	33 mF to 100 mF	100 μ F + 1.1 % of reading	
Oscilloscopes - DC Voltage (50 Ω) ^{FO}	1 mV to 6.6 V	40 μ V + 0.29 % of reading	
Oscilloscopes - DC Voltage (1 M Ω) ^{FO}	1 mV to 130 V	40 μ V + 0.054 4 % of reading	
Oscilloscopes - AC Voltage (50 Ω) ^{FO}	1 mV to 6.6 V	40 μ V + 0.29 % of reading	
Oscilloscopes - AC Voltage (1 M Ω) ^{FO}	1 mV to 130 V	40 μ V + 0.11 % of reading	
Oscilloscopes - Wave Gen. (50 Ω) ^{FO}	0.001 8 Vp-p to 2.5 Vp-p	100 μ V + 0.346 % of reading	
Oscilloscopes - Wave Gen. (1 M Ω) ^{FO}	0.001 8 Vp-p to 55 Vp-p	100 μ V + 0.346 % of reading	
Oscilloscopes - Input Impedance Measure ^{FO}	40 Ω to 60 Ω	0.1 % of reading	
	0.5 M Ω to 1 M Ω	0.1 % of reading	
Oscilloscopes - Leveled Sinewave 50 kHz to 11.1 GHz ^{FO}	5 mV to 5.5 V	100 μ V + 5.07 % of reading	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type E ^{FO}	-250 $^{\circ}$ C to -100 $^{\circ}$ C	0.5 $^{\circ}$ C	Electrical Simulation of Thermocouple Output Fluke 5520A/SC600 Gidep/OEM
	-100 $^{\circ}$ C to -25 $^{\circ}$ C	0.16 $^{\circ}$ C	
	-25 $^{\circ}$ C to 350 $^{\circ}$ C	0.14 $^{\circ}$ C	
	350 $^{\circ}$ C to 650 $^{\circ}$ C	0.16 $^{\circ}$ C	
	650 $^{\circ}$ C to 1 000 $^{\circ}$ C	0.21 $^{\circ}$ C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type J ^{FO}	-210 $^{\circ}$ C to -100 $^{\circ}$ C	0.27 $^{\circ}$ C	
	-100 $^{\circ}$ C to -30 $^{\circ}$ C	0.16 $^{\circ}$ C	
	-30 $^{\circ}$ C to 150 $^{\circ}$ C	0.14 $^{\circ}$ C	
	150 $^{\circ}$ C to 760 $^{\circ}$ C	0.17 $^{\circ}$ C	
	760 $^{\circ}$ C to 1 200 $^{\circ}$ C	0.23 $^{\circ}$ C	



Certificate of Accreditation: Supplement

CMM Calibration and Services

3419 Lonergan Drive, Rockford, IL 61109
 Contact Name: Kim Kirkpatrick Phone: 815-227-4266

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

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type K ^{FO}	-200 °C to -100 °C	0.33 °C	Electrical Simulation of Thermocouple Output Fluke 5520A/SC600 Gidep/OEM
	-100 °C to -25 °C	0.18 °C	
	-25 °C to 120 °C	0.16 °C	
	120 °C to 1 000 °C	0.26 °C	
	1 000 °C to 1 372 °C	0.4 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type R ^{FO}	0 °C to 250 °C	0.57 °C	
	250 °C to 400 °C	0.35 °C	
	400 °C to 1 000 °C	0.33 °C	
	1 000 °C to 1 767 °C	0.4 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type S ^{FO}	0 °C to 250 °C	0.47 °C	
	250 °C to 1 000 °C	0.36 °C	
	1 000 °C to 1 400 °C	0.37 °C	
	1 400 °C to 1 767 °C	0.46 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type T ^{FO}	-250 °C to -150 °C	0.63 °C	
	-150 °C to 0 °C	0.24 °C	
	0 °C to 120 °C	0.16 °C	
	120 °C to 400 °C	0.14 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type B ^{FO}	600 °C to 800 °C	0.44 °C	
	800 °C to 1 000 °C	0.34 °C	
	1 000 °C to 1 550 °C	0.3 °C	
	1 550 °C to 1 820 °C	0.33 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type C ^{FO}	0 °C to 150 °C	0.3 °C	
	150 °C to 650 °C	0.26 °C	
	650 °C to 1 000 °C	0.31 °C	
	1 000 °C to 1 800 °C	0.5 °C	
	1 800 °C to 2 316 °C	0.84 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type L ^{FO}	-200 °C to -100 °C	0.37 °C	
	-100 °C to 800 °C	0.26 °C	
	800 °C to 900 °C	0.17 °C	
Temperature Calibration, Indication and Control Equipment used with Thermocouple Type N ^{FO}	-200 °C to -100 °C	0.4 °C	
	-100 °C to -25 °C	0.22 °C	
	-25 °C to 120 °C	0.19 °C	
	120 °C to 410 °C	0.18 °C	
	410 °C to 1 300 °C	0.27 °C	



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Resistance Source ^{FO}	Up to 11 Ω	0.27 m Ω + 11 $\mu\Omega/\Omega$	Fluke 5520A/SC600 Gidep/OEM
	11 Ω to 33 Ω	0.64 m Ω + 8 $\mu\Omega/\Omega$	
	33 Ω to 110 Ω	0.44 m Ω + 8.1 $\mu\Omega/\Omega$	
	110 Ω to 330 Ω	0.85 m Ω + 10 $\mu\Omega/\Omega$	
	330 Ω to 1.1 k Ω	2.3 m Ω + 9.6 $\mu\Omega/\Omega$	
	1.1 Ω to 3.3 k Ω	4.7 m Ω + 13 $\mu\Omega/\Omega$	
	3.3 k Ω to 11 k Ω	8.9 m Ω + 12 $\mu\Omega/\Omega$	
	11 k Ω to 33 k Ω	75 m Ω + 12 $\mu\Omega/\Omega$	
	33 k Ω to 110 k Ω	120 m Ω + 12 $\mu\Omega/\Omega$	
	110 k Ω to 330 k Ω	550 m Ω + 13 $\mu\Omega/\Omega$	
	330 k Ω to 1.1 M Ω	1.5 Ω + 12 $\mu\Omega/\Omega$	
	1.1 M Ω to 3.3 M Ω	8.8 Ω + 24 $\mu\Omega/\Omega$	
	3.3 M Ω to 11 M Ω	290 Ω + 32 $\mu\Omega/\Omega$	
	11 M Ω to 33 M Ω	4.6 k Ω + 58 $\mu\Omega/\Omega$	
	33 M Ω to 110 M Ω	46 k Ω + 48 $\mu\Omega/\Omega$	
	110 M Ω to 330 M Ω	1.7 M Ω + 0.18 m Ω/Ω	
330 M Ω to 1.1 G Ω	7.3 M Ω + 2.2 m Ω/Ω		
Frequency Source ^{FO}	45 Hz to 120 Hz	0.11 mHz	
	120 Hz to 1.2 kHz	0.98 mHz	
	1.2 kHz to 12 kHz	9.3 mHz	
	12 kHz to 120 kHz	93 mHz	
	120 kHz to 1.2 MHz	0.93 Hz	
	1.2 MHz to 2 MHz	1.7 Hz	



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Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Torque ^{FO}	5 in·oz to 50 in·oz	0.5 % of reading	CDI 5000ST
	4 in·lb to 50 in·lb	0.5 % of reading	CDI 5000ST
	30 in·lb to 400 in·lb	0.5 % of reading	CDI 5000ST
	80 in·lb to 1 000 in·lb	0.5 % of reading	CDI 5000ST
	20 ft·lb to 250 ft·lb	0.5 % of reading	CDI 5000ST
Torque ^F	100 ft·lb to 1 000 ft·lb	0.7 % of reading	AWS Model ITF 1000
Pressure Gage ^{FO}	20 psi to 2 000 psi	($2.58 \times 10^{-1} + 5.11 \times 10^{-4}P$) psi	Nitropak Nitrogen Calibration Source And Digital Test Gage NAVAIR 17-20MP-165
	1 500 psi to 7 000 psi	0.17 psi + 0.011 % of reading	Dead Weight Tester Digital Test Gage NAVAIR 17-20MP-165
	7 000 psi to 15 000 psi	0.17 psi + 0.013 % of reading	Dead Weight Tester Digital Test Gage NAVAIR 17-20MP-165
Indirect Verification of Vickers Hardness ^{FO}	220 HV to 720 HV	13 HV	Master Test Blocks Stage,
Indirect Verification of Knoop Hardness ^{FO}	220 HK to 500 HK	15 HK	Micrometer/Microscope ASTM E384
Indirect Verification of Rockwell Hardness ^{FO}	HRA		Certified Test Blocks ASTM E18-08a
	20 HRA to 65 HRA	1.3 HRA	
	70 HRA to 78 HRA	1.3 HRA	
	80 HRA to 84 HRA	1.3 HRA	
	HRBW		
	40 HRBW to 59 HRBW	1.5 HRBW	
	60 HRBW to 79 HRBW	1.5 HRBW	
	80 HRBW to 100 HRBW	1.4 HRBW	
	HRC		
	20 HRC to 30 HRC	1.3 HRC	
	35 HRC to 55 HRC	1.3 HRC	
	60 HRC to 65 HRC	0.78 HRC	
	HR15N		
	70 HR15N to 77 HR15N	1.4 HR15N	
	78 HR15N to 88 HR15N	1.4 HR15N	
90 HR15N to 92 HR15N	1.1 HR15N		



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Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Indirect Verification of Rockwell Hardness ^{FO}	HR15N		Certified Test Blocks ASTM E18-08a
	70 HR15N to 77 HR15N	1.4 HR15N	
	78 HR15N to 88 HR15N	1.4 HR15N	
	90 HR15N to 92 HR15N	1.1 HR15N	
	HR45N		
	20 HR15N to 31 HR45N	1.5 HR45N	
	37 HR15N to 61 HR45N	1.5 HR45N	
	66 HR15N to 72 HR45N	1.1 HR45N	
	HR30TW		
	43 HR30TW to 56 HR30TW	1.5 HR30TW	
	57 HR30TW to 69 HR30TW	1.5 HR30TW	
	70 HR30TW to 83 HR30TW	1.4 HR30TW	

Mass, Force, and Weighing Devices

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Force Gage ^{FO}	5 lb to 110 lb	$0.17 + 2 \times 10^{-3}F$ lb	Class F Weights, Torque Standard And Fixture NAVAIR 17-20MF-04
	1 g to 2 268 g	$(77 + 2 \times 10^{-3}F)$ g	
Weight Scale ^{FO}	1 g to 1 000 g	$(1.13 \times 10^{-2} + 5.1 \times 10^{-4}Wt)$ g	Class F Weights Handbook 44
	2.5 lb to 110 lb	$(4.55 \times 10^{-2} + 4.55 \times 10^{-3}Wt)$ g	

- The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represent the smallest measurement uncertainties attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is 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.



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

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. Example: Outside Micrometer^F would mean that the laboratory performs this calibration 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. Example: Outside Micrometer^O would mean that the laboratory performs this calibration onsite at the customer's location.
5. The presence of a superscript FO means that the laboratory performs calibration of the indicated parameter both at its fixed location and onsite at customer locations. Example: Outside Micrometer^{FO} would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.
6. 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.
7. The term D represents diameter in inches or millimeters as appropriate to the uncertainty statement.
8. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
9. The term P represents pressure in units appropriate to the uncertainty statement.
10. The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.
11. The term "X" preceded by a number represents the number of times a lense system magnifies an image relative to its actual size. CMC stated as "% of magnification" represents the CMC of magnification expressed as a percentage of the total magnification.
12. The term F represents Force appropriate to the uncertainty statement.