



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Solve Metrology

2940 44th Street, Suite 1, Grandville, MI 49418

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

ISO/IEC 17025:2005

& Meets the Requirements of ANSI/NCSI Z540.3-2006 Sub Clause 5.3

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 January 2009):

Dimensional and Mechanical 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.

Initial Accreditation Date:

October 1, 2015

Issue Date:

September 30, 2017

Expiration Date:

January 30, 2020

Tracy Szerszen
President/Operations Manager

Accreditation No.:

85517

Certificate No.:

L17-418

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

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.pjlabs.com



Certificate of Accreditation: Supplement

Solve Metrology

2940 44th Street, Suite 1, Grandville, MI 49418
 Contact Name: Curt Kopko Phone: 616-481-5935

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
Micrometers ^{FO}	0.1 in to 12 in	(55 + 2.8L) μ in	Gage Blocks
	12 in to 24 in	(76 + 1.1L) μ in	Mic Standards
Calipers ^{FO}	0.1 in to 12 in	(290 + 0.5L) μ in	Gage Blocks
	12 in to 20 in	(280 + 0.9L) μ in	GGG-C-111c
	20 in to 80 in	(250 + 2.5L) μ in	Gage Blocks
Indicators ^{FO}	0.000 02 in to 0.002 in	(7.5 + 4.5L) μ in	Gage Blocks
	0.000 1 in to 4 in	(31 + 0.5L) μ in	Gage Blocks
	0.000 1 in to 1 in	(33 + 0.08L) μ in	Leed Check B89.1 10-M-2001
Depth Gages ^{FO}	1 in to 12 in	(290 + 0.9L) μ in	Gage Blocks Indicator B89.1.10-M-2001
Depth Micrometers ^{FO}	0.001 in to 12 in	(60 + 2.2L) μ in	Gage Blocks B89.1.13-2013
Digital Readout ^{FO}	0.1 in to 48 in	(71 + 13L) μ in	Indicator Step Master
Optical/Video Measuring Systems Scales ^{FO} Magnification ^{FO} Squareness ^{FO} Angularity ^{FO}	0.1 in to 12 in 10 X to 250 X 0.1 in to 4 in 0° to 90°	(69 + 1.5L) μ in 180 μ in 0.03° 20 μ in/in	Glass Master Glass Scale
Surface Plates ^O Flatness ^O Repeat Reading ^O	6 in x 6 in to 20 ft x 20 ft	(12 + 0.15D) μ in	Electronic Level Repeat-O-Meter Planekator GGG-P-463c
	0.002 in	26 μ in	
Linear Measuring Machine ^O	0.1 in to 84 in	(93 + 8L) μ in	Long Blocks
Precision Levels ^{FO}	4 in to 15 in	(190 – 2.6L) μ in/ft	Surface Plate GGG-L-211D
Protractors ^{FO}	0.1° to 90°	(0.06 + 0.000 02A)°	Angle Blocks Surface Plate GGG-P-676a



Certificate of Accreditation: Supplement

Solve Metrology

2940 44th Street, Suite 1, Grandville, MI 49418
 Contact Name: Curt Kopko Phone: 616-481-5935

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
Pin/Plug Gages ^{FO}	0.001 in to 7 in	(18 + 4.4L) μ in	Gage Blocks Bench Mic Supramess B89.1.5-1988
Thread Gages Pitch Diameter ^{FO}	6-32 to 4-12	(72 + 12L) μ in	Bench Micrometer Thread Wire
Thread Gages Major Diameter ^{FO}	6-32 to 4-12	(34 + 17L) μ in	Gage Blocks B1.2-1991 B1.16M
Length Standards/End Measuring Rods ^{FO}	0.1 in to 24 in	(13 + 4L) μ in	Indicator Gage Blocks B89.1.13-2013
Height Gages ^{FO}	0.000 5 in to 40 in	(400 + 0.6L) μ in	Gage Blocks Step Master GGG-C-111c
Amplifier ^{FO}	0.000 1 in to 0.002 in	(8 + 2 040L) μ in	Gage Blocks
Height Master ^{FO}	0.1 in to 12 in	(13 + 3L) μ in	
Sine Plate/Bar ^{FO}	3 in to 10 in	(0.007 + 0.002A) $^{\circ}$	Gage Blocks Angle Blocks Surface Plate Indicator
Roundness Tester Magnification Radial Error ^{FO}	450 μ in 0.1 in to 12 in	6 μ in 5.4 μ in	Flick Master Precision Ball ASME B89.3.1
Surface Roughness Tester Magnification Straightness ^{FO}	120 μ in Ra 4 in	3.4 μ in 24 μ in	Roughness Master Optical Flat ASME B46.1
Contour Tester Magnification Straightness ^{FO}	8 in	23 μ in 8 μ in	WI-030 Contour Master Optical Flat
Angle Plate ^{FO}	3 in to 12 in	0.000 17 in	GGG-P-441a Cylindrical Square Gage Blocks
Square ^{FO}	2 in to 12 in	0.000 17 in	GGG-S-656d Cylindrical Square Gage Blocks
Radius Gage ^F	0.005 in to 2 in	0.000 13 in	GGG-G-17c Video Inspection
Rules ^F	6 in to 48 in	(120 + 7.5L) μ in	GGG-G-791h Video Inspection
Stage Micrometer ^F	0.02 mm to 10 mm	3.5 μ m	
Angle ^F	1 $^{\circ}$ to 90 $^{\circ}$	0.004 $^{\circ}$	



Certificate of Accreditation: Supplement

Solve Metrology

2940 44th Street, Suite 1, Grandville, MI 49418
 Contact Name: Curt Kopko Phone: 616-481-5935

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
Roughness Standard Ra ^{FO}	10 μ m to 250 μ m	3.1 μ m	ASME B46.1 Roughness Tester and Ra Standard

Mass, Force, and Weighing Devices

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
Tension/Compression Tester-Load Cells ^{FO}	50 lb to 500 lb	0.5 lb	Load Cells ASTM E4
	500 lb to 5 000 lb	6 lb	
	5 000 lb to 30 000 lb	29 lb	
	30 000 lb to 100 000 lb	44 lb	
Force Gage ^{FO}	1 lb to 100 lb	0.12 lb	Class 6 Weights Class 7 Weights
Scales ^O	0.5 g to 5 000 g	(0.001 + 0.000 53Wt) g	Class F weights NIST Handbook 44
	0.1 lb to 1 000 lb	(0.012 + 0.000 52Wt) lb	
	1 000 lb to 10 000 lb	(0.24 + 0.000 54Wt) lb	

Mechanical

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
Brinell Scopes ^{FO}	0.1 mm to 7 mm	0.07 mm	Stage Micrometer ASTM E10
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers ^O	> 80 HRA	0.23 HRA	ASTM-E-18 Test Blocks
	60 HRA to 80 HRA	0.32 HRA	
	< 60 HRA	0.31 HRA	
	> 80 HRBW	0.52 HRBW	
	60 HRBW to 80 HRBW	0.35 HRBW	
	< 60 HRBW	0.4 HRBW	
	> 60 HRC	0.3 HRC	
	40 HRC to 60 HRC	0.31 HRC	
	< 40 HRC	0.33 HRC	
	\geq 90 HR15N	0.3 HR15N	
	80 HR15N to 90 HR15N	0.33 HR15N	
	< 80 HR15N	0.4 HR15N	



Certificate of Accreditation: Supplement

Solve Metrology

2940 44th Street, Suite 1, Grandville, MI 49418
 Contact Name: Curt Kopko Phone: 616-481-5935

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

Mechanical

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
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers ^O	≥ 79 HR30N	0.28 HR30N	ASTM-E-18 Test Blocks
	60 HR30N to 79 HR30N	0.34 HR30N	
	≤ 60 HR30N	0.44 HR30N	
	≥ 65 HR45N	0.25 HR45N	
	50 HR45N to 65 HR45N	0.48 HR45N	
	≤ 50 HR45N	0.48 HR45N	
	≥ 70 HR30TW	0.38 HR30TW	
	50 HR30TW to 70 HR30TW	0.44 HR30TW	
	≤ 55 HR30TW	0.48 HR30TW	
	≥ 50 HR45TW	0.48 HR45TW	
	25 HR45TW to 50 HR45TW	0.53 HR45TW	
≤ 25 HR45TW	0.52 HR45TW		
Indirect Verification of Brinell Hardness Testers ^O	2.5 mm to 4.8 mm	0.08 mm	ASTM E-10 Test Blocks
Torque Wrench ^{FO}	25 lbf-ft to 250 lbf-ft	(0.52 + 0.002T) lbf-ft	Torque calibrator ASME B107.300 -2010
	30 lbf-in to 300 lbf-in	(0.56 + 0.001T) lbf-in	
Indirect Verification of Knoop and Vickers Hardness Tester, ≤ 1 kgf ^O	100 HV to 800 HV	10.1 HV	Indirect verification per ASTM E384 Test blocks
	100 HK to 650 HK	11.7 HK	
	> 650 HK	8.4 HK	
Indirect Verification Vickers Hardness Tester, ≥ 1 kgf ^O	100 HV to 800 HV	9.6 HV	Indirect verification per ASTM E384 Test blocks

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.



Certificate of Accreditation: Supplement

Solve Metrology

2940 44th Street, Suite 1, Grandville, MI 49418
Contact Name: Curt Kopko Phone: 616-481-5935

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

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 Scale^{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 "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.
8. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
9. The term D represents diameter in inches or millimeters as appropriate to the uncertainty statement.
10. The term A represent angle in as appropriate to the uncertainty statement.
11. The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.
12. The term T represents torque in N•m (including SI multiple and submultiple units) for the international system of units (the SI) or ozf•in, lbf•in and lbf•ft for the USC system of units.