PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Solve Metrology

2940 44th Street, Suite I, 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

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 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.

Tracy Szerszen
President/Operations Manager

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

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
October 1, 2015	October 1, 2015	November 30, 2017
Revision Date:	*Accreditation No.:*	*Certificate No.:*
November 29, 2015	85517	L15-317-R1

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

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Pin/Plug Gages [O]	0.001 in to 7 in	(18 + 4.4L) µin	Gage Blocks Bench Mic Supramess B89.1.5-1988
Thread Gages Pitch Diameter [O]	6-32 to 4-12	(72 + 12L) µin	Bench Micrometer Thread Wire Gage Blocks B1.2-1991 B1.16M
Thread Gages Major Diameter [O]	6-32 to 4-12	(34 + 17L) µin	
Length Standards/End Measuring Rods [O]	0.1 in to 24 in	(13 + 4L) µin	Indicator Gage Blocks B89.1.13-2013
Height Gages [O]	0.000 5 in to 40 in	(400 + 0.6L) µin	Gage Blocks Step Master GGG-C-111c
Amplifier [O]	0.000 1 in to 0.002 in	(8 + 2 040L) µin	Gage Blocks
Height Master [O]	0.1 in to 12 in	(13 + 3L) µin	
Sine Plate/Bar [O]	3 in to 10 in	(0.007 ° + 0.002A) °	Gage Blocks Angle Blocks Surface Plate Indicator
Roundness Tester Magnification Radial Error [O]	450 µin	6 µin	Flick Master Precision Ball ASME B89.3.1
	0.1 in to 12 in	3.4 µin	
Surface Roughness Tester Magnification Straightness [O]	120 µin Ra	3.6 µin	Roughness Master Optical Flat ASME B46.1
	4 in	24 µin	
Contour Tester Magnification Straightness [O]	8 in	23 µin	WI-030 Contour Master Optical Flat
		8 µin	

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

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 (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Tensile Tester [O]	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 [O]	1 lb to 100 lb	0.12 lb	Class 6 Weights Class 7 Weights

Mechanical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Brinell Scopes [O]	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	
	≥ 90 HR15N	0.3 HR15N	
	80 HR15N to 90 HR15N	0.33 HR15N	
	< 80 HR15N	0.4 HR15N	
	≥ 79 HR30N	0.28 HR30N	
	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	

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Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers [O]	≥ 70 HR30TW	0.38 HR30TW	ASTM-E-18 Test Blocks
	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

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 [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.

4. 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.

5. The term "X" proceeded 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.