



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994

Precision Calibration Services, Inc.

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CALIBRATION

Valid to: July 16, 2013

Certificate Number: AC-1401

I. Dimensional

Table with 5 columns: PARAMETER / EQUIPMENT, RANGE, CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)], REFERENCE STANDARD OR EQUIPMENT, METHOD(S). Rows include Machine Tools, Ring Gages, Height Gages, Calipers, Micrometer Standards, Radius Gages, Indicator, Height Master, Depth Micrometer, and Micrometer.



PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Steel Rule*	Up to 72 in	(418 + 2.5L) μin	Video Measuring System	OEM and GIDEP
Bore Gages	(0.125 to 18) in	(8.46 + 21.73L) μin	Master Gage Blocks	OEM and GIDEP
Optical Comparator Magnification Length Angularity Squareness	5x to 250x Up to 12 in Up to 360 ° Up to 4 in	(116 + 0.7L) μin (108 + 2.4L) μin 2 min (93 + 0.7L) μin	Glass Scale	OEM and GIDEP
Protractor*	(0 to 360) °	(18 + 10.4L) min	Comparator	OEM and GIDEP
Toolmaker's Microscopes Linearity Magnification	Up to 12 in 5x to 250x	(108 + 2.4L) μin (116 + 0.7L) μin	Glass Scale	OEM and GIDEP
Coordinate Measuring Machine (CMM) Volumetric Linear Displacement Repeatability	Up to 36 in Up to 300 in Up to 10 in	(105 + 4.3L) μin (31 + 0.1L) μin (60 + 16.5L) μin	Ball Bar Laser Measuring System Master Sphere	OEM and GIDEP
Surface Plate Flatness	Up to (144 x 180) in	(1.4D) μin	Electronic Level	OEM and GIDEP
Repeatability	Up to 60 in (60 to 180) in	25 μin 40 μin	Repeat Gage	OEM and GIDEP
Gage Blocks*	Up to 4 in (5 in to 20) in	(2 + 2L) μin (12 + 1.9L) μin	Mechanical Comparison	OEM and GIDEP
Gage Pins	Up to 2 in	(17 + 2L) μin	Laser Gage	OEM and GIDEP
Thread Wires	4 to 80 tpi	(27 + 4.5L) μin	Universal Measuring Machine	OEM and GIDEP
Spheres/ Precision Balls Diameter Only	Up to 12 in	(14 + 2.7L) μin	Master Blocks	OEM and GIDEP
Thread Plugs Pitch diameter	Up to 12 in	(87 + 1.1L) μin	Thread Wires and Supermicrometer	OEM and GIDEP
Tapered Thread Plugs Pitch Diameter	Up to 12 in	(75 + 10.5L) μin	Thread Wires and Supermicrometer	OEM and GIDEP

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Angle Blocks*	Up to 90 °	13 min	Vision Measuring System	OEM and GIDEP
Angle Plates and Squares	Up to 18 in	(112 + 0.47L) μin	Master Square	OEM and GIDEP
Bevel Protractors and Angle Gages	Up to 180 °	2 ° 25'	Comparator	OEM and GIDEP
Brinell Scopes	Up to 0.4 in	(580 + 11L) μin	Glass Reticle / Comparator	OEM and GIDEP
Differential Probes	Up to 5 μin resolution	(3 + 1.9L) μin	Master Gage Blocks	OEM and GIDEP
Feeler Gages	Up to 0.2 in	(32 + 4.8L) μin	Super Micrometer	OEM and GIDEP
Glass Graduated* Rules and Reticles	Up to 12 in	(76 + 2.3L) μin	Vision Measuring System	OEM and GIDEP
Indicator Calibrator	Up to 2 in	(31.6 + 0.105L) μin	Amplifier, Gage Probe	OEM and GIDEP
Inch Bars, Reference Bars, Step Masters	Up to 40 in	(5.3 + 5L) μin	Master Gage Blocks	OEM and GIDEP
Parallels	Up to 36 in	(7.5 + 5L) μin	Amplifier, Gage Probe, Surface Plate	OEM and GIDEP
Pitch Gages	Up to 0.25 in	296 μin	Optical Comparator	OEM and GIDEP
Sine Plates and Sine Bars	Up to 10 in	(30.5 + 3.3L) μin	Amplifier with Gage Probe; Sine Plate; Gage Blocks; Comparator	OEM and GIDEP
Surface Roughness Specimen	(2 to 500) μin	4.16 μin	Surface Finish Analyzer	OEM and GIDEP
V-Blocks Parallelism Squareness	Up to 10 in Up to 10 in	(15 + 4.12L) μin (8.3 + 14.4L) μin	Surface Plate, Gage Pin, Master Square, amp, and Gage Head	OEM and GIDEP
Precision Levels Bubble Levels High Accuracy Electronic	Up to 0.0005 in Resolution	296 μin	Amplifier with Gage Probe; Sine Plate; Gage Blocks	OEM and GIDEP

II. Mechanical

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Weighing Systems	Up to 10 000 lb (0.5 lb) Up to 20 000 lb (5 lb)	1.37 lb 13.7 lb	Class F Weights	Handbook 44 SCP-01
Torque Wrenches	(0.5 to 400) lbf•in (5 to 50) lbf•in Up to 100 lbf•in Up to 200 lbf•in (32.5 to 750) lbf•in (12.5 to 2 000) lbf•ft	2.4 % of reading 1.5 % of reading 0.6 % of reading 0.3 % of reading 0.2 % of reading 0.2 % of reading	Electronic Torque Tester	OEM, GIDEP and TTC-01
Torque Transducers	(125 to 2 000) lbf•ft (5 to 750) lbf•in (0.5 to 400) lbf•oz	0.06 % of reading 0.06 % of reading 0.06 % of reading	Deadweight and Torque Arms	OEM and GIDEP
Force Gages	(5 to 125) lbf (125 to 2 000) lbf	0.08 % of reading 0.3 % of reading	Electronic Tester	OEM, GIDEP and TTC-01
Rockwell Hardness Testers Indirect verification	HRA Low HRA Med HRA High HRB Low HRB Med HRB High HRC Low HRC Med HRC High HR15N Low HR15N Med HR15N High HR30N Low HR30N Med HR30N High HR45N Low HR45N Med HR45N High HR15T Low HR15T Med HR15T High HR30T Low HR30T Med HR30T High HR45T Low HR45T Med HR45T High	0.53 HRA 0.44 HRA 0.36 HRA 1.84 HRB 1.34 HRB 1.10 HRB 0.76 HRC 0.88 HRC 0.54 HRC 0.94 HR15N 0.96 HR15N 0.82 HR15N 0.75 HR30N 0.88 HR30N 0.65 HR30N 0.82 HR45N 0.75 HR45N 0.71 HR45N 0.49 HR15T 1.37 HR15T 0.72 HR15T 0.88 HR30T 0.62 HR30T 0.44 HR30T 0.86 HR45T 1.13 HR45T 0.85 HR45T	Hardness Blocks	Indirect comparison with test blocks to ASTM E-18

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Microhardness Hardness Tester Indirect verification Knoop Vickers	458 HK 463 HK 464 HK 441 HV 440 HV 441 HV	9.15 HK 11.54 HK 13.84 HK 12.19 HV 14.78 HV 21.37 HV	Hardness Blocks	ASTM E384
Brinell Hardness Tester Indirect verification	(100 to 200) BHN (200 to 300) BHN	4.3 BHN 2.08 BHN	Hardness Blocks Stage micrometer	ASTM E10
Durometers	Type A, B O, C D, DO	0.59 N	Durometer Calibrator	OEM and GIDEP and ASTM D2240-05
Pressure	(100 to 10 000) psi	0.334 psi	Deadweight tester	OEM and GIDEP

Notes:

1. Calibration and Measurement Capabilities (Expanded Uncertainty) are based on approximately a 95% confidence interval, using a coverage of $k=2$
2. The uncertainty associated when calibrating a balance/scale is dependent on local conditions, such as the resolution of the unit being calibrated and the environment in which the balance/scale is operating. The uncertainty listed in the scope here represents the best uncertainty for a balance/scale which the organization typically calibrates in its lab. Since field (on-site) conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected in the field (on-site) than what is reported on the accredited scope.
3. An asterisk (*) denotes calibrations that are only available in the company's primary laboratory.
4. For uncertainties expressed as $b + mL$, L = Length in inches.
5. For uncertainties expressed as $b + mD$, D = Diameter or Diagonal in inches.
6. This scope is part of and must be included with the Certificate of Accreditation No. AC-1401



Vice President