

Scope of Accreditation

For

Inspec, Inc

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In recognition of a successful assessment to ISO/IEC 17025:2005, accreditation is granted to **Inspec, Inc** to perform **Calibrations / Testing / Dimensional Inspection** as shown in the following tables:

Accreditation Granted Through: **April 6, 2010**

Calibration

Length - Dimensional Metrology – Hand Tools and Precision Gages 1D

Calibration Parameter/Equipment	Range	Best Measurement Capability (+/-) ²	Remarks
Bore Gages – 2 pt	100 µin to 11 in	95 µin	Height Master, Surface Plate
Bore Gages – 3 pt	0.275 in to 4 in	87 µin	Master Rings
Calipers	500 µin to 40 in	(330 + 3.7L) µin	Gage Blocks, Surface Plate, Ring Gage
Depth Micrometers/ Depth Gages	50 µin to 12 in	(49 + 14L) µin	Gage Blocks, Surface Plate
Indicators High Resolution			
Digital/Dial	0 in to 2 in	(17 + 3.9L) µin	Super Micrometer
Digital/Dial	0 in to 1 in	320 µin	Indicator Checker
Indicators Test	50 µin to 0.06 in	69 µin	Height Master, Surface Plate
Height Gages	500 µin to 24 in 25 in to 40 in	(290+ 1.5L) µin (230 + 2.9L) µin	Reference Bar, Gage Blocks, Surface Plate
Micrometers ¹ O.D.	50 µin to 12 in 13 in to 24 in	(52 + 14L) µin (32 + 15L) µin	Gage Block Comparison, Optical Flats, Surface Plate

Calibration Parameter/Equipment	Range	Best Measurement Capability (+/-) ²	Remarks
Laser Micrometer ¹	10 μin to 1 in	19 μin	Master Plug Gages
Super Micrometer / Bench Micrometer ¹	10 μin to 2 in	(2.4 + 6.5L) μin	Gage Blocks

Length - Dimensional Metrology – Hand Tools and Precision Gages 2D

Calibration Parameter/Equipment ¹	Range	Best Measurement Capability (+/-) ²	Remarks
Levels Bubble	± 0.002 in	250 μin	Surface Plate, Gage Blocks
Federal Electronic Levels	± 990 arc sec	5.7 arc sec	Sine Plate, Gage Blocks. Surface Plate
Optical Comparator	50 μin to 12 in	(97 + 17L) μin	High Precision Glass Scale
Vision System ¹	10 μin to 24 in	(76 + 2.1L) μin	

Length - Dimensional Metrology – Hand Tools and Precision Gages 3D

Calibration Parameter/Equipment ¹	Range	Best Measurement Capability (+/-) ²	Remarks
Coordinate Measuring Machine Linearity	0.1 in to 1 600 in	(34 + 2.1L) μin	Renishaw Laser System
Coordinate Measuring Machine Volumetric	4 in to 40 in	(43 + 7.8L) μin	Ball Bar
Coordinate Measuring Machine, Repeatability	1 in	46 μin	Sphere
Machine Tool Linearity	0.1 in to 1 600 in	(22 + 8.1L) μin	Laser

Calibration Parameter/Equipment¹	Range	Best Measurement Capability(+/-)²	Remarks
Machine Tool Volumetric	4 in to 24 in	$(65 + 2.3L) \mu\text{in}$	Renishaw Transducer & Ball Bar

Length - Dimensional Metrology – Artifacts and Standards 1D

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-)²	Remarks
Surface Plate Repeatability	10 μin to 0.002 in	21 μin	Repeat-o-Meter
Surface Plate, Angularity / Flatness ¹	6 in to 144 in	$(75 + 0.012DL) \mu\text{in}$	Electronic Level
Feeler Gages ¹	0.001 in to 0.1 in	94 μin	Digital Micrometer
Gear / Thread Measuring Wires ¹	0.001 in to 1 in	18 μin	Super Micrometer
Height Master ¹	0.3 in to 24 in	$(16 + 3.8L) \mu\text{in}$	Reference Bar, Gage Blocks, Surface Plate
Parallels – Flatness & Parallelism Vee Block, Square	0.1 in to 72 in	27 μin	Surface Plate, Amplifier Granite Angle Comparison
Length Standards ¹	1 in to 37 in	$(14 + 3.7L) \mu\text{in}$	Reference Bar, Amplifier, Surface Plate
Pin Gages ¹	0.011 in to 1 in	31 μin	Laser Micrometer
Plug Gages	0.004 in to 5 in	$(12 + 6.2L) \mu\text{in}$	Super Micrometer
Ring Gages	0.5 in to 4 in 4 in to 8 in	$(10.5 + 6.5L) \mu\text{in}$ $(8.1 + 7L) \mu\text{in}$	Super Micrometer
Spheres Size Sphericity	0 in to 2 in	17 μin 8.9 μin	Super Micrometer Talyrond 300
Gage Blocks	0 in to 4 in	$(2.4 + 1L) \mu\text{in}$	Comparator, Gage Blocks

Length - Dimensional Metrology – Other

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Thread / Set Plugs	0 in to 5 in	(72 + 7.4D) μin	Super Micrometers / Thread Wires

Mass – Torque

Calibration Parameter/Equipment	Range	Best Measurement Capability(+/-) ²	Remarks
Torque Wrenches	4 lbf-in to 50 lbf-in 30 lbf-in to 400 lbf-in 80 lbf-in to 1000 lbf-in 20 lbf-ft to 250 lbf-ft 60 lbf-ft to 600 lbf-ft	0.59 lbf-in 1.5 lbf-in 3.1 lbf-in 1.2 lbf-ft 2.7 lbf-ft	Measured using Torque Transducer

Mass – Hardness

Calibration Parameter/Equipment ¹	Range	Best Measurement Capability(+/-) ²	Remarks
Hardness Tester			
Rockwell	A Scale		Indirect comparison with test blocks to ASTM E-18
	Low	0.57 HRA	
	Medium	0.43 HRA	
	High	0.3 HRA	
	B Scale		
	Low	0.76 HRB	
	Medium	0.81 HRB	
	High	0.69 HRB	
	C Scale		
	Low	0.41 HRC	
	Medium	0.57 HRC	
	High	0.42 HRC	
	HR15N Scale		
	Low	0.58 HR15N	
	Medium	0.54 HR15N	
	High	0.48 HR15N	
	HR30N Scale		
	Low	0.67 HR30N	
	Medium	0.59 HR30N	
	High	0.46 HR30N	
	HR45N Scale		
Low	0.57 HR45N		
Medium	0.61 HR45N		
High	0.57 HR45N		
HR15T Scale			
Low	0.72 HR15T		
Medium	0.53 HR15T		
High	0.56 HR15T		

Calibration Parameter/Equipment ¹	Range	Best Measurement Capability(+/-) ²	Remarks
Rockwell	HR30T Scale Low Medium High HR45T Scale Low Medium High	0.64 HR30T 0.59 HR30T 0.52 HR30T 0.7 HR45T 0.58 HR45T 0.56 HR45T	Indirect comparison with test blocks to ASTM E-18
Hardness Tester ¹ Brinell	(100 to 200) BHN (200 to 300) BHN	3.8 BHN 5.2 BHN	Indirect comparison with test blocks to ASTM E-10
Hardness Tester Micro indentation Knoop Vickers	(100 to 250) HK (250 to 650) HK (650 to 700) HK (100 to 240) HV (240 to 600) HV (600 to 700) HV	4.2 HK 5.7 HK 9.8 HK 3.9 HV 11 HV 25 HV	Indirect comparison with test blocks to ASTM E-384

Dimensional Inspection

Length - Dimensional Inspection – Dimensional Measurement 1D

Inspection Parameter	Range	Best Measurement Capability (+/-) ²	Remarks
Roundness Measurement	0.25 in to 4 in	13 μin	Talyrond 300
Surface Finish	1 Ra to 300 Ra	7.5 Ra	Profilameter
Length 1D	Up to 12 in	(60 + 5.5L) μin	Height Master, Surface Plate, Amplifier



Length - Dimensional Inspection – Dimensional Measurement 2D

Inspection Parameter	Range	Best Measurement Capability (+/-) ²	Remarks
Length - 2-Dimensional	Up to 24 in	(380 + 2.8L) μin	Video Inspection Machine
	Up to 8 x 12 in	(260 + 18L) μin	Optical Comparator
Angle	0° to 360°	0.0017°	Coordinate Measuring Machine

Length - Dimensional Inspection – Dimensional Measurement 3D


Inspection Parameter	Range	Best Measurement Capability (+/-) ²	Remarks
Volumetric Position	Up to (79 x 47 x 39) in	(49 + 16L) μin	Coordinate Measuring Machine

Testing

Technology	Range, when necessary	Method Used	Products Types	Remarks
Hardness Tester Rockwell	HRB Low Middle High HRC Low Middle High HR30T Low Middle High	ASTM E18	Metallic Materials	

Notes:

- 1) Laboratory offers calibration services at the laboratory's own facilities and at the client or other agreed upon facilities. Calibrations / Testing uncertainties are higher
- 2) Best uncertainties, expressed as a percentage of the applied test load, represent expanded uncertainties at approximately the 95% confidence level using a coverage factor of k=2.
- 3) *L* = the nominal length of device in inches. *DL* = the diagonal length of device in inches

Approved by:  Date: June 04, 2009

R. Douglas Leonard
Chief Technical Officer

Revised: 10/15/08 Revised 06/04/09