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: **July 22, 2013**

Calibration

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

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Bore Gages – 2 pt	100 µin to 1 in	95 µin	Height Master. Surface Plate
Bore Gages[1] – 3 pt	0.2750 in to 4 in	88 µin	Master Rings
Calipers[1]	500 µin to 40 in	(280 + 4.78*L*) µ	Gage Blocks, Surface Plate, Ring Gage
Depth Micrometers/ Depth Gages[1]	50 µin to 12 in	(46 + 13.6*L*) µin	Gage Blocks, Surface Plate
Indicators High Resolution Digital/Dial Digital/Dial[1]	 20 µin to 2 in 50 µin to 1 in	 (16 + 4.28*L*) µin 320 µin	 Super Micrometer Indicator Checker
Indicators[1] Test	50 µin to 0.06 in	68 µin	Height Master, Surface Plate
Height Gages[1]	500 µin to 24 in 25 in to 40 in	(290 + 1.73*L*) µin (250 + 3.27*L*) µin	Reference Bar, Gage Blocks, Surface Plate

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Micrometers[1] O.D.	.050 in to 12 in 13 in to 24 in	(46 + 14*L*) µin (30 + 15.4*L*) µin	Gage Block Comparison, Optical Flats, Surface Plate
Laser Micrometer[1]	10 µin to 1 in	20 µin	Master Plug Gages
Super Micrometer[1]	10 µin to 2 in	(2 + 7.17*L*) µin	Gage Blocks

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

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Levels - Bubble	± 0.002 in	250 µin	Surface Plate, Gage Blocks
Levels - Electronic	± 990 arc sec	5.7 arc sec	Sine Plate, Gage Blocks, Surface Plate
Optical Comparator[1]	50 µin to 12 in	(82 + 24.2*L*) µin	High Precision Glass Scale
Vision System[1]	10 µin to 24 in	(60 + 3.55*L*) µin	

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

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Coordinate Measuring Machine Linearity[1]	0.1 in to 1 600 in	(32 + 2.82*L*) µin	Renishaw Laser System
Coordinate Measuring Machine, Volumetric[1]	4 in to 40 in	(42 + 11*L*) µin	Ball Bar
Coordinate Measuring Machine, Repeatability[1]	1 in	52 µin	Sphere

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Machine Tool Linearity[1]	0.1 in to 1 600 in	(21 + 11.4*L*) µin	Laser
Machine Tool Volumetric[1]	4 in to 24 in	(63 + 3.35*L*) µin	Renishaw Transducer & Ball Bar

Length - Dimensional Metrology – Artifacts and Standards 1D

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Surface Plate Repeatability[1]	10 µin to 0.002 in	21 µin	Repeat-o-Meter
Surface Plate, Angularity[1] / Flatness[1]	6 in to 144 in	32 µin	Electronic Levels
Feeler Gages[1]	0.001 in to 0.1 in	96 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	(17 + 3.92*L*) µin	Reference Bar, Amplifier 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	(16 + 3.95*L*) µin	Reference Bar, Amplifier, Surface Plate
Pin Gages[1]	0.011 in to 1 in	32 µin	Laser Micrometer
Plug Gages	0.004 in to 5 in	(11 + 8.61*L*) µin	Super Micrometer
Ring Gages	0.240 in to 4 in 4.1 in to 8 in	(9.6 + 7.71*L*) µin (6.8 + 9.85*L*) µin	Super Micrometer
Spheres Size Sphericity	0 in to 2 in	17 µin 8.6 µin	Super Micrometer, Talyrond 300
Gage Blocks	0.005 in to 4 in	(1.3 + 0.678*L*) µin	Comparator, Gage Blocks

Length - Dimensional Metrology – Other

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Thread / Set Plugs	.010 in to 2 in	(89 + 6.59*DL*)µin	Super Micrometers / Thread Wires

Mass – Torque

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Torque Wrenches[1]	5 lbf.in to 50 lbf.in 40 lbf.in to 400 lbf.in 100 lbf.in to 1 000 lbf.in 25 lbf.ft to 250 lbf.ft 60 lbf.ft to 600 lbf.ft	0.67 lbf·in + 0.104% of reading 3.10 lbf·in + 0.041% of reading 6.10 lbf·in + 0.059% of reading 1.20 lbf·ft + 0.079% of reading 5.80 lbf·ft + 0.048% of reading	Measured using Torque Transducer

Mass – Hardness

Calibration Parameter/Equipment	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Hardness Tester[1]			
Rockwell	A Scale		Indirect comparison with test blocks to ASTM E-18
	Low	0.57 HRA	
	Medium	0.42 HRA	
	High	0.30 HRA	
	B Scale		
	Low	0.76 HRB	
	Medium	0.88 HRB	
	High	0.69 HRB	
	C Scale		
	Low	0.41 HRC	
	Medium	0.63 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	0.57 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	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Rockwell	HR30T Scale Low Medium High HR45T Scale Low Medium High	 0.64 HR30T 0.59 HR30T 0.52 HR30T 0.70 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[1] 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	Calibration and Measurement Capability(+/-) [2]	Remarks
Roundness Measurement	0.25 to 4 in	6.9 µin	Talyrond 300
Surface Finish	1 to 300 Ra	3.9 Ra	Profilometer
Length 1D	Up to 12 in	(59 + 5.79*L*) µin	Height Master, Surface Plate, Amplifier

Length - Dimensional Inspection – Dimensional Measurement 2D

Inspection Parameter	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Length - 2-Dimensional	Up to 48 in	(140 + 3.71*L*) µin	Video Inspection Machine
	Up to 8 x 12 in	(260 + 16.1*L*) µin	Optical Comparator

Length - Dimensional Inspection – Dimensional Measurement 3D

Inspection Parameter	Range	Calibration and Measurement Capability(+/-) [2]	Remarks
Volumetric 3D Position Steel [1]	Up to (80 x 48 x 40) in	(140 + 9.49*L*) µin	Coordinate Measuring Machine
Volumetric 3D Position Aluminum [1]	Up to (80 x 48 x 40) in	(100 + 24.2*L*) µin	Coordinate Measuring Machine
Volumetric 3D Position Plastic [1]	Up to (80 x 48 x 40) in	(15 + 159*L*) µin	Coordinate Measuring Machine
Angle [3]	0º to 360º	6.84 arc sec	Coordinate Measuring Machine

Testing

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) Calibration and Measurement Capability represent expanded uncertainties at approximately a 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: July 22, 2010

R. Douglas Leonard
Chief Technical Officer

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