



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

Quality Engineering Service, LLC

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TESTING and CALIBRATION

Valid to: September 22, 2014

Certificate Number: ACT - 1189

I. Mechanical Testing

FIELD OF TEST	ITEMS, MATERIALS OR PRODUCTS TESTED	SPECIFIC TESTS OR PROPERTIES MEASURED	SPECIFICATION, STANDARD METHOD OR TECHNIQUE USED	*DETECTION LIMIT / RANGE / EQUIPMENT
Push Test	Plastic Fasteners, Screws, Adhesives, 3-D objects within equipment operational range	Tensile, Shear	CUP-T1001-A	Up to 1 000 lb Lloyd Type B
Push Test	Plastic Fasteners, Screws, Adhesives, 3-D objects within equipment operational range	Tensile, Shear	CUP-T1002-A	Up to 1 000 lb Lloyd Type B
Pull Test	Plastic Fasteners, Screws, Adhesives, 3-D objects within equipment operational range	Tensile, Shear, Elongation, Breaks	CUP-T1002-A	Up to 1 000 lb Lloyd Type B
Pull Test	Plastic Fasteners, Screws, Adhesives, 3-D objects within equipment operational range	Tensile, Pluck, Elongation, Breaks	CUP-T1004-A	Up to 1 000 lb Lloyd Type B
Shear Test	Plastic Fasteners, Screws, Adhesives, 3-D objects within equipment operational range	Shear, Elongation, Breaks, Adhesion Strength	CUP-T1003-A	Up to 1 000 lb Lloyd Type B
Shear Test	Plastic Fasteners, Screws, Adhesives, 3-D objects within equipment operational range	Shear, Elongation, Breaks, Adhesion Strength	CUP-D1002-A	Up to 1 000 lb Lloyd Type B
Torque Testing	Screws, Grommets, Bolts	Strip Torque, Drive Torque, Torsional Strength	CUP-F.I.P 1000-A	Up to 300 in-lb Torque Wrench, Type B Tolerance ± % of Reading
Ductility Testing	Screws & Bolts	Ductility Testing	CUP-F.I.P 1000-A	Empirical Observation for Pass / Fail
Drive Test	Screws & Bolts	Drive Test	CUP-F.I.P 1000-A	Empirical Observation for Pass / Fail
Part Weighing	3-D objects within equipment operational range	Part Weights	RFM-0025-1	Up to 310 g ± 0.01 g



II. Dimensional Inspection

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHODS
Dimensional 1D	Up to 6 in (6 to 60) in	730 μ in 910 μ in	Caliper	Blue Print or Customer Specification
Dimensional 1D	Up to 16 in	740 μ in	Height Gage	Blue Print or Customer Specification
Dimensional 1D	Up to 6 in	730 μ in	Length Gage	Blue Print or Customer Specification
Dimensional 1D	Up to 2 in	96 μ in	Micrometer	Blue Print or Customer Specification
Dimensional 1D	Up to 6 in	130 μ in	Depth Micrometer	Blue Print or Customer Specification
Dimensional 1D	Up to 1 in (1 to 2) in	93 μ in 95 μ in	Drop Indicator	Blue Print or Customer Specification
Dimensional 1D	Up to 0.003 in	77 μ in	Test Indicator	Blue Print or Customer Specification
Dimensional 1D	(0.011 to 0.6255) in	580 μ in	Pin Gages	Blue Print or Customer Specification
Dimensional 1D	Up to 14 in	124 μ in	Gage Blocks	Blue Print or Customer Specification
Dimensional 1D	(0.01 to 0.5) in (0.5 to 13) mm	2890 μ in 73 μ m	Radius Gages	Blue Print or Customer Specification
Dimensional 1D	Up to 0.5 in Radius: Up to 0.5 in Angular: 90 °	2 890 μ in 0.036 inches 1.6 °	Handheld Microscope (7x)	Blue Print or Customer Specification
Dimensional 2D	Up to 14 in Dia. & Radius : Calculated Angular : 360 °	460 μ in 0.19 °	Optical Comparator	Blue Print or Customer Specification
Dimensional 2D	Up to 4 in Radius : 3 mm Angular : 360 °	491 μ in 0.12 mm 0.11 °	Measuring Microscope	Blue Print or Customer Specification
Dimensional 2D	Up to 1 in	43.0 μ in	Laser Micrometer	Blue Print or Customer Specification
Dimensional 3D	X & Y = Up to 12 in Z = Up to 6 in Volumetric : Calculated Angular : 360 °	106 μ in 107 μ in 0.0059 °	Video Measuring System	Blue Print or Customer Specification
Dimensional 3D	X & Y = Up to 20 in Z = Up to 16 in Volumetric : Calculated Angular : 360 °	261 μ in 168 μ in 0.065 °	Brown & Sharpe Coordinate Measuring Machine	Blue Print or Customer Specification

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHODS
Dimensional 3D	X & Y = Up to 40 in Z = Up to 24 in Volumetric : Calculated Angular : 360 °	44.2 μ in 44.2 μ in 0.0042 °	Coordinate Measuring Machine – Zeiss Contura G2 Scanning	Blue Print or Customer Specification
Dimensional Visual Comparison	Pitches UNC (4 to 84)	Nearest 2 teeth per Inch	Screw Pitch Gage	Blue Print or Customer Specification
Dimensional Visual Comparison	2L to 500ST	Best match visual under 30x magnification	Surface Finish Comparator Plate	Blue Print or Customer Specification

III. Dimensional Calibration

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Calipers	Up to 60 in	(590 + 24.8L) μ in	Caliper Calibration Set Gage Blocks	Cal-001
Height Gages	Up to 20 in	(603 + 9.3L) μ in	Gage Blocks	Cal-001
Length Gages	Up to 20 in	(590 + 24.8L) μ in	Gage Blocks	Cal-001
Micrometers (ID, OD, Depth)	Up to 12 in	(90.7 + 3.1L) μ in	Gage Blocks	Cal-002 Cal-017 Cal-020
Drop or Dial Indicators	(0.0001 to 6) in	(90.4 + 1.6L) μ in	Gage Blocks	Cal-003
Test Indicators	(0.0001 to 0.100) in	77 μ in	Gage Blocks	Cal-004
Radius Gages	Up to 10 in	106 μ in	Video Measurement System	Cal-013
Protractors	Up to 180 °	0.0059 °	Angle Blocks	Cal-015
Pin Gages	(0.010 to 1.000) in	(42.4 - .80L) μ in	Laser Micrometer	Cal-018

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Thickness Gages & Other Fixed Gages Report of Values Only	Up to 2.0 in	96 μ in	High Accuracy Digital Indicator	Cal-014, Cal-019 Cal-020 & Cal-014
	Up to 12 in Up to 360 °	107 μ in 0.0059 °	Video Measurement System	
	Up to 20 in / Up to 360 °	261 μ in 0.065 °	Coordinate Measuring Machine – Manual Brown & Sharp	
	Up to 40 in Up to 360 °	(21 + 1.3L) μ in 0.00042 °	Coordinate Measuring Machine – Zeiss Contura G2	
Gage Blocks	Up to 40 in	(21 + 1.3L) μ in	Coordinate Measuring Machine – Zeiss Contura G2 Gage Block Comparison Indicator	Cal-020
Steel Rules	Up to 36 in	2 900 μ in	Microscope Handheld / Master Steel Rule	Cal-016
Coordinate Measuring Machines	Up to 48 in	45.1 μ in	CMM Calibration Gage Blocks Spherical Ball Bar	Cal-022 ASME B89.4.1-1997

IV. Mechanical Calibration

PARAMETER / EQUIPMENT	RANGE	CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY (\pm)]	REFERENCE STANDARD OR EQUIPMENT	METHOD(S)
Scales & Balances	Up to 600 g	1.2 g	Calibration Weight Set	Cal-021

Notes :

- 1) * = As Applicable
- 2) Calibration and Measurement Capabilities represent expanded uncertainties at approximately the 95% confidence level using a coverage factor of $k=2$.
- 3) This laboratory offers commercial calibration, dimensional, functional testing and documentation services.
- 4) The term L represents length in inches.
- 5) This scope is part of and must be included with the Certificate of Accreditation No. ACT - 1189

Karl Greenway

Vice President