



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Berg Engineering & Sales Company, Inc.

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CALIBRATION

Valid to: February 4, 2020

Certificate Number: L1157-1

Electrical – DC/Low Frequency

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Magnetic Inspection Unit	(500 to 10 000) A	12 A + 1.5% of reading	Current Shunts
Magnetic Inspection Unit Gauss Meter	(0 to 75) G	5 G + 8.6% of reading	Gauss meter
Electromagnetic (Eddy Current) Conductivity Meters ³	8 %IACS 9 %IACS 49 %IACS 88 %IACS 101 %IACS	0.25 %IACS + 0.95% of reading	Eddy Current Conductivity Standards
Electromagnetic (Eddy Current) Flaw Detector Horizontal Linearity	X Gain \pm 40 dB Freq \pm 200 kHz Spot X \pm 88	0.065 Div	Aluminum and 4340 Carbon Steel reference materials
Electromagnetic (Eddy Current) Flaw Detector Vertical Linearity	Y Gain \pm 40 dB Freq \pm 200 kHz Spot Y \pm 88 11	0.62 Div	Aluminum and 4340 Carbon Steel reference materials

Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Ultrasonic Corrosion Thickness Gauge	(0.03 to 2) in (0.06 to 8) in	0.001 4 in	ASTM E797
Ultrasonic Precision Thickness Gauge	(0.007 to 0.5) in (0.1 to 4) in	0.11 in	ASTM E797
XY Stage (X Value)	(0 to 5) mm	5.9 μ m	Stage Micrometer



Length – Dimensional Metrology

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
XY Stage (Y Value)	(0 to 5) mm	5.9 µm	Stage Micrometer
Brinell Scope	(0 to 7) mm	0.058 mm	
Optical Measuring Scope	(0 to 7) mm	0.058 mm	
Optical Measuring Scales	(0 to 10) mm 100X 500X	4.1 µm 4.8 µm	
Profilometer (Ra) ³	16.1 µin 119.5 µin	0.61 µin 1.5 µin	Roughness Standard ASME-B46.1
Ultrasonic Velocity Gauge	(0.18 to 0.24) in / µs	0.11 in / µs	ASTM E494
Ultrasonic Flaw Detector (Vertical Linearity)	(0.01 to 1 100) in	1 % of reading	ASTM E317
Ultrasonic Flaw Detector (Horizontal Linearity)	(0.01 to 1 100) in	0.59 % of reading	

Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Rockwell Hardness Testers ¹	HRA		ASTM E18 and ISO 6508-2 Indirect Verification using test blocks
	Low	0.43 HRA	
	Middle	0.22 HRA	
	High	0.21 HRA	
	HRBW		
	Low	1.1 HRBW	
	Middle	0.95 HRBW	
	High	0.58 HRBW	
	HRC		
	Low	0.43 HRC	
	Middle	0.38 HRC	
	High	0.33 HRC	
HREW			
Low	0.34 HREW		
Middle	0.22 HREW		
High	0.52 HREW		



Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment		
Rockwell Hardness Testers ¹	HRF Low Middle High	0.64 HRF 0.51 HRF 0.48 HRF	ASTM E18 and ISO 6508-2 Indirect Verification using test blocks		
	HR15N Low Middle High	0.44 HR15N 0.53 HR15N 0.26 HR15N			
	HR15Tw Low Middle High	0.63 HR15Tw 0.41 HR15Tw 0.33 HR15Tw			
	HR30TW Low Middle High	0.61 HR30TW 0.46 HR30TW 0.36 HR30TW			
	HR30N Low Middle High	0.44 HR30N 0.36 HR30N 0.31 HR30N			
	HR45N Low Middle High	0.57 HR45N 0.26 HR45N 0.26 HR45N			
	Portable Rockwell Hardness Tester	HRC Low Middle High		0.43 HRC 0.39 HRC 0.34 HRC	ASTM E110 Indirect Verification using test blocks
	Brinell Hardness Tester	(500 to 3 000) kg		4.8 BHN	ASTM E10 Indirect Verification using test blocks
	Brinell Optical Scanning System	(140 to 700) BHN		0.009 mm	
	Brinell Hardness Tester	(1 to 3 000) kgf		6.7 kgf	ASTM E10 Direct Verification
	Leeb Hardness Tester	(200 to 765) LD (300 to 750) LG		19 LD 19 LG	ASTM A956 Indirect Method using test blocks



Mass and Mass Related

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment
Leeb Hardness Test Block	(500 to 800) LD (500 to 800) LG	19 LD 22 LG	
Portable Hardness Gauge UCI Method	(20 to 66) HRC	0.58 HRC	ASTM A1038 Indirect Method using test blocks
Vickers Hardness Testers	(200 to 772) HV	12 HV	ASTM E384/E92 Indirect Method using test blocks
Knoop Hardness Testers	(200 to 734) HK	14 HK	

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Spectral Irradiance (UV-A) (315 to 400) nm Black Light	(10 to 10 000) $\mu\text{W} / \text{cm}^2$	8.1 $\mu\text{w}/\text{cm}^2 + 7.2\%$ of reading	UVA Detector and display unit using laboratory developed method
Illuminance responsivity (Illuminant A ϕ CIE) White Light (380 to 760) nm	(2 to 400) fc	8.5% of reading	White light Detector and display unit using laboratory developed method
Luminance responsivity White Light (380 to 760) nm	(100 to 130 000) fL	5.3% of reading	Illuminance probe and display unit using laboratory developed method

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Magnetic Inspection Unit Shot Duration	(0 to 3) s	670 ms	ASTM E1444

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. IACS unit of measure is defined as Eddy Current electrical conductivity in percentage to the International Annealed Copper Standard whereas 0.58×10^8 S/m is equivalent to 100% IACS.
3. Fixed points are approximate nominal values.
4. This scope is formatted as part of a single document including Certificate of Accreditation No. L1157-1.



Vice President

