CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Kanawha Scales and Systems LLC

243 West Alexander Road
Valley Grove, WV 26060

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

Jason Stine, Vice President

Expiry Date: 27 March 2027

Certificate Number: L1166.08-1

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Kanawha Scales and Systems LLC
243 West Alexander Road
Valley Grove, WV 26060
Candice Bryant
304-464-5312

CALIBRATION

Valid to: **March 27, 2027** Certificate Number: **L1166.08-1**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current [1] Source	(0 to 202) µA	0.08 µA	Comparison to Transmille 3041A
	(0.2 to 2.02) mA	0.0096 mA	
	(2 to 20.2) mA	0.0017 mA	
	(20 to 202) mA	0.03 mA	
	(0.2 to 2.02) A	0.001 3 A	
	(2 to 30) A	0.017 A	
AC Current [1] Source	(0 to 202) µA		Comparison to Transmille 3041A
	(10 to 44) Hz	0.13 µA	
	(45 to 999) Hz	0.12 µA	
	(1 to 10) kHz	0.12 µA	
	(0.2 to 2.02) mA		
	(10 to 44) Hz	0.002 mA	
	(45 to 999) Hz	0.003 mA	
	(1 to 10) kHz	0.002 mA	
	(2 to 20.2) mA		
	(10 to 44) Hz	0.036 mA	
	(45 to 999) Hz	0.016 mA	
	(1 to 10) kHz	0.036 mA	
	(20 to 202) mA		
	(10 to 44) Hz	0.16 mA	
	(45 to 999) Hz	0.15 mA	
	(1 to 10) kHz	0.15 mA	
	(0.2 to 2.02) A		
	(10 to 44) Hz	0.002 A	
	(45 to 999) Hz	0.002 A	
	(1 to 10) kHz	0.003 A	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current [1] Source	(2 to 30) A (30 to 44) Hz (45 to 99) Hz (100 to 1) kHz	 0.03 A 0.03 A 0.05 A	Comparison to Transmille 3041A
DC Current [1] Measure	300 µA 3 mA 30 mA 300 mA 1 A	240 nA 2 µA 20 µA 65 µA 2.1 mA	Comparison to Hewlett Packard 3457A
AC Current [1] Measure	(0 to 30) mA (10 to 44) Hz (45 to 999) Hz (1 to 10) kHz	 31 µA 28 µA 21 µA	
	(30 to 300) mA (10 to 44) Hz (45 to 999) Hz (1 to 10) kHz	 180 µA 270 µA 270 µA	
	(0.3 to 3) A (10 to 44) Hz (45 to 999) Hz (1 to 10) kHz	 1.6 mA 20 mA 20 mA	
Resistance RTD Simulation 3 Wire Configuration [1] Pt 50 Pt 100 Pt 200 Pt 500 Pt 1 000 D 100 D 100 Ni 100 Ni 120 Cu 10	 (-200 to 850) °C (-200 to 850) °C (-200 to 850) °C (-200 to 850) °C (-200 to 400) °C (-200 to 510) °C (510 to 645) °C (-60 to 250) °C (-80 to 260) °C (-200 to 850) °C	 1.1 °C 0.8 °C 1 °C 0.8 °C 0.7 °C 0.7 °C 0.7 °C 0.7 °C 0.8 °C 2.4 °C	Electrical Simulation using Druck TRX-II; Electronic Calibration of Temperature Indicating Devices

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance RTD Simulation 4 Wire Configuration [1]			Electrical Simulation using Druck TRX-II; Electronic Calibration of Temperature Indicating Devices
Pt 50	(-200 to 850) °C	0.8 °C	
Pt 100	(-200 to 850) °C	0.7 °C	
Pt 200	(-200 to 850) °C	0.9 °C	
Pt 500	(-200 to 850) °C	0.8 °C	
Pt 1 000	(-200 to 400) °C	0.6 °C	
D 100	(-200 to 510) °C	0.7 °C	
D 100	(510 to 645) °C	0.7 °C	
Ni 100	(-60 to 250) °C	0.6 °C	
Ni 120	(-80 to 260) °C	0.6 °C	
Cu 10	(-200 to 850) °C	2.4 °C	
Resistance 2 Wire Configuration [1] Source	0 Ω	0.006 Ω	Comparison to Transmille 3041A
	0.1 Ω	0.006 Ω	
	1 Ω	0.006 4 Ω	
	10 Ω	0.009 5 Ω	
	100 Ω	0.034 Ω	
	1 kΩ	0.000 31 kΩ	
	10 kΩ	0.003 1 kΩ	
	100 kΩ	0.03 kΩ	
	1 MΩ	0.000 4 MΩ	
	10 MΩ	0.007 5 MΩ	
	100 MΩ	0.71 MΩ	
	1 000 MΩ	16 MΩ	
Resistance 4 Wire Configuration [1] Measure	30 Ω	640 uΩ	Comparison to Hewlett Packard 3457A
	300 Ω	1.9 mΩ	
	3 kΩ	10 mΩ	
	30 kΩ	91 mΩ	
	300 kΩ	1.2 Ω	
	3 MΩ	30 Ω	
	30 MΩ	610 Ω	
DC Voltage [1] Source	(0 to 202) mV	0.021 mV	Comparison to Transmille 3041A
	(0.2 to 2.02) V	0.14 mV	
	(2 to 20.2) V	0.012 V	
	(20 to 202) V	0.016 V	
	(200 to 1 025) V	0.047 V	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Voltage [1] Measure	(0 to 30) mV (0 to 300) mV (0 to 3) V (0 to 30) V (0 to 300) V	10 µV 3.3 µV 52 µV 300 µV 21 mV	Comparison to Hewlett Packard 3457A
Thermocouple Millivolt Simulation [1]			Electrical Simulation using Transmille 3041A with Transmille 8104 Electronic Calibration of Temperature Indicating Devices
Type B	300 °C 500 °C 1000 °C 1500 °C 1820 °C	1.5 °C 0.93 °C 0.53 °C 0.44 °C 0.38 °C	
Type E	-250 °C (-100 °C to 1000) °C	0.48 °C 0.12 °C	
Type J	-210 °C (-100 to 1 200) °C	0.26 °C 0.15 °C	
Type K	-240 °C -200 °C (-100 to 1370) °C	0.65 °C 0.32 °C 0.18 °C	
Type N	-200 °C -100 °C 0 °C (100 to 1300) °C	0.49 °C 0.28 °C 0.25 °C 0.2 °C	
Type R	-50 °C 100 °C 500 °C (1000 to 1768) °C	1.3 °C 0.68 °C 0.51 °C 0.45 °C	
Type S	-50 °C 100 °C (500 to 1768) °C	1.2 °C 0.65 °C 0.5 °C	
Type T	-250 °C -200 °C -100 °C (0 to 400) °C	0.73 °C 0.31 °C 0.19 °C 0.15 °C	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage Source [1]	(20.2 to 202) mV		Comparison to Transmille 3041A
	(10 to 45) Hz	0.033 mVAC	
	(45 to 1 000) Hz	0.049 mVAC	
	(1 to 20) kHz	0.047 mVAC	
	(20 to 100) kHz	0.062 mVAC	
	(100 to 500) kHz	0.096 mVAC	
	(0.202 to 2.02) V		
	(10 to 45) Hz	0.012 VAC	
	(45 to 1 000) Hz	0.012 VAC	
	(1 to 20) kHz	0.012 VAC	
	(20 to 100) kHz	0.012 VAC	
	(100 to 500) kHz	0.012 VAC	
	(2.02 to 20.2) V		
	(10 to 45) Hz	0.003 VAC	
	(45 to 1 000) Hz	0.002 VAC	
	(1 to 20) kHz	0.004 VAC	
	(20 to 100) kHz	0.052 VAC	
	(20.2 to 202) V		
	(30 to 45) Hz	0.027 VAC	
	(45 to 1 000) Hz	0.044 VAC	
	(1 to 20) kHz	0.150 VAC	
AC Voltage Source [1]	(202 to 1 020) V		Comparison to Transmille 3041A
	(30 to 45) Hz	0.200 VAC	
	(45 to 1 000) Hz	0.042 VAC	
	(1 to 10) kHz	0.130 VAC	
AC Voltage Measure [1]	(0 to 30) mV		Comparison to Hewlett Packard 3457A
	(20 to 45) Hz	32 µV	
	(46 to 100) Hz	97 µV	
	(101 to 20) kHz	5.6 µV	
	(0 to 300) mV		
	(20 to 45) Hz	130 µV	
	(46 to 100) Hz	90 µV	
	(101 to 20) kHz	130 µV	
	(0 to 3) V		
	(20 to 45) Hz	11 mV	
	(46 to 100) Hz	1.4 mV	
	(101 to 20) kHz	1.6 mV	
	(0 to 30) V		
	(20 to 45) Hz	14 mV	
	(46 to 100) Hz	9.9 mV	
	(101 to 20) kHz	14 mV	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage Measure [1]	(0 to 300) V (20 to 45) Hz (46 to 100) Hz (101 to 20) kHz	 120 mV 79 mV 120 mV	

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Tape Measure [1]	(0 to 100) ft	0.149 in	Comparison to Standard Gage Blocks / Rule Standard
Steel Rules [1]	(0 to 72) in	0.011 in	
Length Standards	(0 to 18) in	260 µin	Comparison to Length Standards & OD Micrometer
	(19 to 48) in	930 µin	
	(49 to 70) in	0.001 4 in	
	(71 to 90) in	0.001 7 in	
Hand Tools - Dial / Digital Indicator, OD/ID/Depth Micrometers, Calipers [1]	0.1 Inch 0.2 Inch 0.3 Inch 0.5 Inch 0.7 Inch 1.0 Inch 2 Inch 4 Inch 8 Inch 12 Inch 18 Inch 24 Inch 30 Inch 36 Inch 42 Inch 48 Inch	0.000011 inch 0.000014 Inch 0.000016 Inch 0.000017 Inch 0.000022 Inch 0.000046 Inch 0.000055 Inch 0.00011 Inch 0.00022 Inch 0.00033 Inch 0.00076 Inch 0.00087 Inch 0.001 Inch 0.0011 Inch 0.0013 Inch 0.0014 Inch	Comparison to Gage Blocks
Height Gages [1]	(0 to 12) in (12 to 48) in	0.00035 Inch 0.0013 Inch	Comparison to Gage Blocks and Surface Plate

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Optical Comparator Linearity Angles Magnification	 (0 to 10) in (0 to 360) ° (10 to 50) X	 740 µin 27 arc seconds 270 µin	Comparison to Glass Scale Angle Standards

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Oven Air Exchanges [1]	(0.001 to 1) m^3/min	0.055 m^3/min	ASTM E145
Pressure/Vacuum Gages [1]	(0 to 65) psia	0.002 5 % rdg + 0.000 78 psi	ASME B40.100 Mensor CPC 6000 Fluke P3114-PSI
	(0 to 1 000) psi	0.002 1 % rdg + 0.003 8 psi	
	(200 to 10 000) psi	0.008 % rdg + 0.061 psi	
Torque Wrench [1]	(4 to 50) lbf·in	0.75 % of reading	Comparison to CDI Torque Calibration System
	(30 to 400) lbf·in	0.75 % of reading	
	(80 to 1000) lbf·in	0.75 % of reading	
	(20 to 250) lbf·ft	0.75 % of reading	
	(60 to 600) lbf·ft	0.75 % of reading	

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Class F Mass Standards (Test Weights)	500 mg 1 g 2 g 3 g 5 g 10 g 20 g 30 g 50 g 100 g 200 g 300 g 500 g 1 kg 2 kg 3 kg 5 kg 6 kg 7 kg 8 kg 10 kg 20 kg 30 kg	13 µg 16 µg 30 µg 42 µg 42 µg 65 µg 66 µg 0.104 µg 0.145 µg 0.317 µg 0.432 µg 1.13 mg 1.11 mg 10 mg 14 mg 16 mg 91 mg 92 mg 94 mg 95 mg 96 mg 121 mg 151 mg	Mass Comparison using Modified Substitution
Class F Mass Standards (Test Weights)	0.5 lb 1 lb 2 lb 3 lb 4 lb 5 lb 10 lb 15 lb 20 lb 25 lb 30 lb 50 lb 10 000 lb	1.4 mg 1.7 mg 9.4 mg 9.6 mg 9.8 mg 10.5 mg 15.3 mg 95.4 mg 118.7 mg 105 mg 112 mg 147 mg 0.26 lb	Mass Comparison using Modified Substitution
Weight Cart NIST HB 105-8 Table 1. Tolerances	10 000 lb	0.91 lb	Mass Comparison using Modified Substitution

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Class I, Unmarked and High Precision Lab Balances [1,3]	(0 to 50) g 100 g 200 g 300 g 500 g 1 000 g 2 000 g 5 000 g 10 000 g 20 000 g 25 000 g 50 000 g	0.14 mg 0.37 mg 0.24 mg 0.64 mg 0.97 mg 1.8 mg 3.5 mg 0.012 g 0.019 g 0.035 g 0.060 g 0.095 g	ASTM E617 Class 1 Weights and NIST Handbook 44 utilized for the calibration of the Weighing System
Class II, Unmarked and High Precision Balances & Scales [1,3]	(1 to 200) g 300 g (301 to 2 000) g (5 000 to 50 000) g	0.000 37 % of Applied Load 0.000 43 % of Applied Load 0.000 36 % of Applied Load 0.000 5 % of Applied Load	ASTM E617 Class 2 Weights and NIST Handbook 44 utilized for the calibration of the Weighing System
Class III, Unmarked & Equivalent Industrial Scales [1,2,3]	(0.1 to 100 000 lb) (100 000 to 300 000) lb (0.1 to 1.2) kg (1.2 to 100 000) kg	0.013 % of Applied Load 0.003 % of Applied Load 0.024 % of Applied Load 0.01 % of Applied Load	NIST Class F and/or ASTM E617 Class 6 Weights and NIST Handbook 44 utilized for the calibration of the Weighing System
Class IIIL Vehicle and Hopper Scales [1,3]	(1 to 100 000) lb (1 to 300 000) lb (0.1 to 1.2) kg (1.2 to 100 000) kg	0.013% of Applied Load 0.003% of Applied Load 0.024% of Applied Load 0.01% of Applied Load	NIST Class F and/or ASTM E617 Class 6 Weights and NIST Handbook 44 utilized for the calibration of the Weighing System
Force- Gages: Tension & Compression, Load Cells	(0.1 to 500) kgf (0.1 to 1000) lbf	0.017 % of Applied Load-Tension 0.049 % of Applied Load-Compression	ASTM E617 Class 6 Weights

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Pycnometer Weight & Volume	(50 to 1 000) cm^3	0.072 % of Applied Load	ASTM Class 2 Weights 5 kg Balance Thermometers, Pressure Gages API MPMS Ch. 9.4

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Humidity Indicators [1]	(10 to 90) % RH	3% RH	Comparison to Thermohygrometer
Temperature Measure [1]	(-77 to 550) °C	0.18 °C	Comparison to SPRT Standards Venus Stirred Liquid Bath ASL Bath
Liquid in Glass Thermometers [1]	(0 to 140) °C	0.38 °C	Comparison to Isotech TTI-7 Indicator SPRT Standards Venus Stirred Liquid Bath
Ovens, Furnaces, Freezers [1]	(0 to 250) °C	0.7 °C	ASTM E145

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Stopwatches	elapsed time up to 24 hours	0.07 sec	Comparison to NIST WWVB signal
Oven Time Constant [1]	(0 to 1 200) sec	0.26 sec	ASTM E145
Frequency Sourcing	100 Hz 1 KHz 10 KHz 20 KHz 50 KHz 100 KHz	0.002 Hz 0.007 Hz 0.02 Hz 0.04 Hz 0.04 Hz 0.1 Hz	Comparison to Transmille 3041A

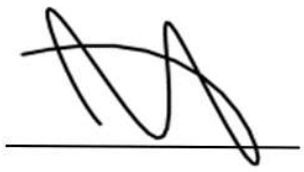
Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency Measure [1]	10 Hz to 400 Hz 400 Hz to 1.5 MHz	0.005 Hz 0.048 Hz	Comparison to Hewlett Packard 3457A

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. Industrial Scales include but not limited to lab balances, bench and floor scales, tank and hopper scales and vehicle scales
3. The CMCs for balances and scales are highly dependent on the resolution of the unit under test. The CMCs presented here do not include the resolution of the unit under test. The resolution will be included in the reported uncertainty at the time of calibration.
4. Laboratory offers custom (specific scale) uncertainty budget when requested by client
5. This scope is formatted as part of a single document including Certificate of Accreditation No. L1166.08-1.



Jason Stine, Vice President