



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

EXELON POWERLABS, LLC NEW ENGLAND DIVISION

Plattsburgh, NY

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. 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 8 January 2009*).



Presented this 26th day of August 2009.

A handwritten signature in black ink, reading "Peter Abney".

President & CEO
For the Accreditation Council
Certificate Number 2044.02
Valid to August 31, 2011

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.



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

EXELON POWERLABS, LLC – NEW ENGLAND DIVISION
 8 Colorado Street
 Plattsburg, NY 12903
 Mark Waters Phone: 518 566 6450 (Ext 111)

CALIBRATION

Valid To: August 31, 2011

Certificate Number: 2044.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Dimensional

Parameter	Range	CMC ^{2,6} (±)	Comments
Dial Indicators	(0 to 1) in	60 μin	Comparison to gage blocks
Micrometers	(0 to 36) in	(4 + 10L + 0.6R) μin	Comparison to gage blocks
Calipers	(0 to 36) in	(4 + 10L + 0.6R) μin	Comparison to gage blocks

II. Electrical – DC & Low Frequency

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
DC Voltage – Measure	(0 to 120) mV	7 μV/V + 0.3 μV	HP 3458A option 2
	100 mV to 1.2 V	6 μV/V + 0.3 μV	
	(1 to 12) V	6 μV/V + 0.5 μV	See Footnote 3
	(10 to 120) V	8 μV/V + 30 μV	
	(100 to 1050) V	8 μV/V + 100 μV	

Parameter/Equipment	Range	CMC ^{2,8,9} (\pm)	Comments
DC Voltage – Generate	(0 to 220) mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	9 μ V/V + 0.8 μ V 8 μ V/V + 1.2 μ V 8 μ V/V + 4 μ V 8 μ V/V + 8.6 μ V 9 μ V/V + 100 μ V 11 μ V/V + 600 μ V	Fluke 5700A, series I
DC Current – Measure	(10 to 120) μ A 100 μ A to 1.2 mA (1 to 12) mA (10 to 120) mA 100 mA to 1.05 A	25 μ A/A + 0.8 nA 25 μ A/A + 5 nA 25 μ A/A + 50 nA 40 μ A/A + 500 nA 0.012 % + 10 μ A	HP 3458A option 2
DC Current – Generate	(0 to 220) μ A 220 μ A to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 11) A	60 μ A/A + 10 nA 60 μ A/A + 10 nA 60 μ A/A + 100 nA 70 μ A/A + 1 μ A 95 μ A/A + 30 μ A 0.036 % + 480 μ A	Fluke 5700A with 5725A See Footnote 4 See Footnote 5
Resistance – Measure	(0 to 12) Ω (10 to 120) Ω (100 to 1200) Ω (1 to 12) k Ω (10 to 120) k Ω 100 k Ω to 1.2 M Ω (1 to 12) M Ω (10 to 120) M Ω	18 $\mu\Omega/\Omega$ + 51 $\mu\Omega$ 15 $\mu\Omega/\Omega$ + 500 $\mu\Omega$ 13 $\mu\Omega/\Omega$ + 500 $\mu\Omega$ 13 $\mu\Omega/\Omega$ + 5 m Ω 13 $\mu\Omega/\Omega$ + 50 m Ω 18 $\mu\Omega/\Omega$ + 2 Ω 53 $\mu\Omega/\Omega$ + 100 Ω 0.05 % + 1 k Ω	HP 3458A option 2
Fixed Points	(9 to 90) M Ω (90 to 900) M Ω 900 M Ω to 1 G Ω (9 to 90) G Ω (90 to 900) G Ω 900 G Ω to 1 T Ω	0.029 % of reading + 500 Ω 0.041 % of reading + 5 k Ω 0.058 % of reading + 100 k Ω 0.081 % of reading + 1 M Ω 0.12 % of reading + 5 M Ω 0.23 % of reading + 400 M Ω	Guildline 9520

Parameter/Range	Frequency	CMC ^{2,9} (±)	Comments
AC Resistance – Generate, Fixed Points			
10 Ω	DC to 1 MHz	0.12 % of reading	HP 42030A 4-terminal resistance set
100 Ω	DC to 1 MHz	0.12 % of reading	
1 kΩ	DC to 100 kHz 100 kHz to 1 MHz	0.12 % of reading 0.08 % of reading	
10 kΩ	DC to 100 kHz 100 kHz to 1 MHz	0.08 % of reading 0.08 % of reading	
100 kΩ	DC to 100 kHz 100 kHz to 1 MHz	0.08 % of reading 0.12 % of reading	
AC Voltage – Measure			
(1 to 12) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.03 % + 3 μV 0.02 % + 1.1 μV 0.03 % + 1.1 μV 0.1 % + 1.1 μV 0.5 % + 1.1 μV 4 % + 2 μV	HP 3458A option 2
(12 to 120) mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	72 μV/V + 4 μV 72 μV/V + 2 μV 0.014 % + 2 μV 0.03 % + 2 μV 0.08 % + 2 μV 0.3 % + 10 μV 1 % + 10 μV 1.5 % + 10 μV	
120 mV to 1.2 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	72 μV/V + 40 μV 72 μV/V + 20 μV 0.014 % + 20 μV 0.03 % + 20 μV 0.08 % + 20 μV 0.3 % + 100 μV 1 % + 100 μV 1.5 % + 100 μV	

Parameter/Range	Frequency	CMC ^{2,8,9} (±)	Comments
AC Voltage – Measure (cont)			
(1.2 to 12) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	72 µV/V + 0.4 mV 72 µV/V + 0.2 mV 0.014 % + 0.2 mV 0.03 % + 0.2 mV 0.08 % + 0.2 mV 0.3 % + 1 mV 1 % + 1 mV 1.5 % + 1 mV	HP 3458A option 2
(12 to 120) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.02 % + 4 mV 0.02 % + 2 mV 0.02 % + 2 mV 0.035 % + 2 mV 0.12 % + 2 mV 0.4 % + 10 mV 1.5 % + 10 mV	
(120 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.04 % + 40 mV 0.04 % + 20 mV 0.06 % + 20 mV 0.12 % + 20 mV 0.3 % + 20 mV	
AC Voltage – Generate			
(0.22 to 2.2) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.06 % + 5 µV 0.024 % + 5 µV 0.012 % + 5 µV 0.041 % + 5 µV 0.095 % + 8 µV 0.13 % + 15 µV 0.18 % + 30 µV 0.36 % + 30 µV	Fluke 5700A, series I
(2.2 to 22) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.06 % + 6 µV 0.024 % + 6 µV 0.012 % + 6 µV 0.041 % + 6 µV 0.095 % + 8 µV 0.13 % + 15 µV 0.18 % + 30 µV 0.36 % + 30 µV	

Parameter/Range	Frequency	CMC ^{2,8,9} (±)	Comments
AC Voltage – Generate (Cont.)			
(22 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.06 % + 16 μV 0.024 % + 11 μV 0.011 % + 10 μV 0.036 % + 11 μV 0.09 % + 30 μV 0.11 % + 30 μV 0.18 % + 40 μV 0.36 % + 100 μV	Fluke 5700A, series I
220 mV to 2.2 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.06 % + 100 μV 0.018 % + 34 μV 85 μV/V + 8.8 μV 0.014 % + 25 μV 0.028 % + 80 μV 0.048 % + 150 μV 0.12 % + 400 μV 0.24 % + 1 mV	
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.06 % + 1 mV 0.018 % + 340 μV 86 μV/V + 70 μV 0.014 % + 300 μV 0.028 % + 430 μV 0.06 % + 1.7 mV 0.14 % + 5 mV 0.30 % + 9 mV	
(22 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.06 % + 10 mV 0.018 % + 3.3 mV 91 μV/V + 1.1 mV 0.025 % + 4.2 mV 0.06 % + 10 mV 0.16 % + 110 mV 0.54 % + 110 mV 1.3 % + 220 mV	
(220 to 1100) V	50 Hz to 1 kHz	90 μV/V + 4.2 mV	
(220 to 1100) V	40 Hz to 1 kHz (1 to 20) kHz (20 to 30) kHz	90 μV/V + 4 mV 0.017 % + 6 mV 0.06 % + 11 mV	Fluke 5700A with 5725A
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.06 % + 11 mV 0.23 % + 45 mV	

Parameter/Range	Frequency	CMC ^{2, 8} (±)	Comments
AC Current – Measure			
(12 to 120) µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 1 kHz	0.4 % + 30 nA 0.15 % + 30 nA 0.06 % + 30 nA 0.06 % + 30 nA	HP 3458A option 2
120 µA to 1.2 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.4 % + 200 nA 0.15 % + 200 nA 0.06 % + 200 nA 0.03 % + 200 nA	
(1.2 to 12) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.4 % + 2 µA 0.15 % + 2 µA 0.06 % + 2 µA 0.03 % + 2 µA	
(12 to 120) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.4 % + 20 µA 0.15 % + 20 µA 0.06 % + 20 µA 0.03 % + 20 µA	
(0.12 to 1) A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.4 % + 200 µA 0.16 % + 200 µA 0.08 % + 200 µA 0.1 % + 200 µA	
AC Current – Generate			
(10 to 220) µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.08 % + 30 nA 0.042 % + 25 nA 0.016 % + 20 nA 0.07 % + 50 nA 0.18 % + 100 nA	Fluke 5700A
(0.22 to 2.2) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.08 % + 50 nA 0.042 % + 40 nA 0.016 % + 40 nA 0.07 % + 500 nA 0.18 % + 1 µA	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.08 % + 500 nA 0.042 % + 400 nA 0.016 % + 400 nA 0.07 % + 5 µA 0.18 % + 10 µA	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.08 % + 5 µA 0.042 % + 4 µA 0.018 % + 4.1 µA 0.07 % + 50 µA 0.18 % + 100 µA	

Peter Abney

Parameter/Range	Frequency	CMC ^{2, 8} (±)	Comments
AC Current – Generate (Cont.) (0.22 to 2.2) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.075 % + 40 µA 0.085 % + 100 µA 1.0 % + 200 µA	Fluke 5700A
(2.2 to 11) A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.046 % + 170 µA 0.095 % + 380 µA 0.36 % + 750 µA	Fluke 5700A with 5725A
Inductance – Measure			
10 µH to 100 µH 100 µH to 1 mH 1 mH to 16 mH 16 mH to 40 mH 40 mH to 100 mH 100 mH to 20 H	300 Hz to 100 kHz 30 Hz to 100 kHz 12 Hz to 100 kHz 12 Hz to 30 kHz 12 Hz to 10 kHz 12 Hz to 5 kHz	0.08 % of reading 0.05 % of reading 0.05 % of reading 0.05 % of reading 0.05 % of reading 0.03 % of reading	Quad Tech 1689
Capacitance – Generate			
(0.19 to 0.4) nF (0.4 to 1.1) nF (1.1 to 3.3) nF (3.3 to 11) nF (11 to 33) nF (33 to 110) nF (110 to 330) nF (0.33 to 1.1) µF (1.1 to 3.3) µF (3.3 to 11) µF (11 to 33) µF (33 to 110) µF (110 to 330) µF (0.33 to 1.1) mF (1.1 to 3.3) mF (3.3 to 11) mF (11 to 33) mF (33 to 110) mF	10 Hz to 10 kHz 10 Hz to 10 kHz (10 to 3000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 1000) Hz (10 to 600) Hz (10 to 300) Hz (10 to 150) Hz (10 to 120) Hz (10 to 80) Hz Up to 50 Hz Up to 20 Hz Up to 6 Hz Up to 2 Hz Up to 0.6 Hz Up to 0.2 Hz	0.5 % + 0.01 nF 0.5 % + 0.01 nF 0.5 % + 0.01 nF 0.25 % + 0.01 nF 0.25 % + 0.1 nF 0.25 % + 0.1 nF 0.25 % + 0.3 nF 0.25 % + 1 nF 0.25 % + 3 nF 0.25 % + 10 nF 0.4 % + 30 nF 0.45 % + 100 nF 0.45 % + 300 nF 0.45 % + 1 µF 0.45 % + 3 µF 0.45 % + 10 µF 0.75 % + 30 µF 1.1 % + 100 µF	Fluke 5520A
Capacitance – Measure			
10 pF to 100 pF 100 pF to 1 nF 1 nF to 1.6 µF	100 Hz to 20 kHz 100 Hz to 100 kHz 12 Hz to 100 kHz	0.15 % of reading 0.03 % of reading 0.03 % of reading	Quad Tech 1689

Parameter/Equipment	Frequency	CMC ² (±)	Comments
Capacitance – Generate, Fixed Points			
1 pF	1 kHz 1 MHz	0.036 % of reading 0.05 % of reading	HP 16380A/16380C standard air capacitor set
10 pF	1 kHz 1 MHz	0.01 % of reading 0.025 % of reading	
100 pF	1 kHz 1 MHz	0.01 % of reading 0.025 % of reading	
1000 pF	1 kHz 1 MHz	0.01 % of reading 0.05 % of reading	
0.01 μF	120 Hz 1 kHz 10 kHz 100 kHz	0.025 % of reading 0.01 % of reading 0.025 % of reading 0.05 % of reading	
0.1 μF	120 Hz 1 kHz 10 kHz 100 kHz	0.025 % of reading 0.01 % of reading 0.025 % of reading 0.05 % of reading	
1 μF	120 Hz 1 kHz 10 kHz 100 kHz	0.04 % of reading 0.01 % of reading 0.04 % of reading 0.1 % of reading	
Phase – Generate			
0° to 90°	(10 to 65) Hz (65 to 500) Hz 500 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.1° 0.25° 0.5° 2.5° 5° 10°	Fluke 5520A

Parameter/Equipment	Range	CMC ^{2,7} (±)	Comments
Electrical Calibration of Thermocouple Devices –			
Type E	-250 °C to -100 °C -100 °C to -25 °C -25 °C to 350 °C 350 °C to 650 °C 650 °C to 1000 °C	0.5 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C	Fluke 5520A
Type J	-210 °C to -100 °C -100 °C to -30 °C -30 °C to 150 °C 150 °C to 760 °C 760 °C to 1200 °C	0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C	
Type K	-200 °C to -100 °C -100 °C to -30 °C -25 °C to 120 °C 120 °C to 1000 °C 1000 °C to 1372 °C	0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.4 °C	
Type R	0 °C to 250 °C 250 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1767 °C	0.57 °C 0.35 °C 0.33 °C 0.4 °C	
Type S	0 °C to 250 °C 250 °C to 1000 °C 1000 °C to 1400 °C 1400 °C to 1767 °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C	
Type T	-250 °C to -150 °C -150 °C to 0 °C 0 °C to 120 °C 120 °C to 400 °C	0.63 °C 0.24 °C 0.16 °C 0.14 °C	

Parameter/Equipment	Range	CMC ^{2,7} (\pm)	Comments
Oscilloscope –			
50 Ω load	DC	0.25 % of output + 40 μ V	Fluke 5520A/SC1100
1 M Ω load	DC	0.05 % of output + 40 μ V	
Squarewave Signal			
50 Ω at 1 kHz	1.0 mV to 6.6 V _{p-p}	0.25 % of output + 40 μ V	
1 M Ω			
10 Hz to 1 kHz	1.0 mV to 130 V _{p-p}	0.1 % of output + 40 μ V	
(1 to 10) kHz	1.0 mV to 130 V _{p-p}	0.25 % of output + 40 μ V	
Level Sine Wave			
Amplitude (50 kHz reference)	50 kHz	2 % + 300 μ V	
	50 kHz to 100 MHz	3.5 % + 300 μ V	
	(100 to 300) MHz	4 % + 300 μ V	
	(300 to 600) MHz	6 % + 300 μ V	
	(600 to 1100) MHz	7 % + 300 μ V	
Flatness (50 kHz reference)	50 kHz to 100 MHz	1.5 % + 100 μ V	
	(100 to 300) MHz	2 % + 100 μ V	
	(300 to 600) MHz	4 % + 100 μ V	
	(600 to 1100) MHz	5 % + 100 μ V	
Time Markers – Source and Period into a 50 Ω load	5 s to 50 ms 20 ms to 2 ns	(25 + 1000t) parts in 10 ⁶ 2.5 parts in 10 ⁶	t = time in seconds
Rise Time			
\leq 2 MHz	\leq 300 ps	+ 0 ps / -100 ps	
$>$ 2 MHz	\leq 350 ps	+ 0 ps / -100 ps	
Wave Generator			
Amplitude			
1 M Ω	1.8 mV to 55 V _{pk-pk}	3 % of output + 100 μ V	
50 Ω	1.8 mV to 2.5 V _{pk-pk}	3% of output + 100 μ V	
Frequency	10 Hz to 100 kHz	25 parts in 10 ⁶ + 15 mHz	

III. Electrical – RF & Microwave

Parameter/Range	Frequency	CMC ² (±)	Comments
Power – Measure ¹⁰			
1 mW, 50Ω	(10 to 30) MHz	0.41 % of reading	HP 432A with HP 478A-H76 and HP 3458A
(-30 to +20) dBm, 50Ω	(100 to 300) kHz SWR ≤ 1.6:1	0.13 dB	HP 436A with HP 8482A
	300 kHz to 1 MHz SWR ≤ 1.2:1	0.081 dB	
	1 MHz to 2 GHz SWR ≤ 1.1:1	0.078 dB	
	(2 to 4.2) GHz SWR ≤ 1.3:1	0.10 dB	
	(10 to 30) MHz SWR ≤ 1.4:1	0.069 dB	HP 436A with HP 8481A
	(30 to 50) MHz SWR ≤ 1.18:1	0.069 dB	
	50 MHz to 2 GHz SWR ≤ 1.1:1	0.071 dB	
	(2 to 12.4) GHz SWR ≤ 1.18:1	0.078 dB	
	(12.4 to 18) GHz SWR ≤ 1.28:1	0.097 dB	
	(50 to 100) MHz SWR ≤ 1.15:1	0.084 dB	HP 436A with HP 8485A
	100 MHz to 2 GHz SWR ≤ 1.1:1	0.087 dB	
	(2 to 12.4) GHz SWR ≤ 1.15:1	0.093 dB	
	(12.4 to 18) GHz SWR ≤ 1.2:1	0.1 dB	
	(18 to 26.5) GHz SWR ≤ 1.25:1	0.12 dB	

IV. Mechanical

Parameter/Equipment	Range	CMC ² (±)	Comments
Torque Wrenches	(0 to 6500) ft·lb	0.5 % of reading	CDI 2000 torque calibration systems

V. Time and Frequency

Parameter/Range	Frequency	CMC ^{2,7} (\pm)	Comments
Frequency – Generate	0.01 Hz to 2 MHz	2.5 parts in $10^6 + 5 \mu\text{Hz}$	Fluke 5520A
Frequency – Measure	(1 to 100) Hz 100 Hz to 1 kHz (1 to 10) kHz (10 to 100) kHz 100 kHz to 1 MHz (1 to 10) MHz (10 to 100) MHz (100 to 225) MHz 100 MHz to 1 GHz (3 to 5) GHz (5 to 12.4) GHz	1.8 μHz 1 μHz 10 μHz 100 μHz 1 mHz 10 mHz 100 mHz 230 mHz 1 Hz 5 Hz 12 Hz	53131A, referenced to the WWVB

¹ This laboratory offers commercial calibration service.

² Calibration and Measurement Capability (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capabilities represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Add to uncertainty specification: ± 12 part in $10^6 \times (V_{in} / 1000)^2$ for > 100 V.

⁴ Add to uncertainty specification: $\pm 200 \times I^2$ part in 10^6 for > 100 mA.

⁵ Add to uncertainty specification: $\pm 10 \times I^2$ for > 1 A.

⁶ In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches; R is the numerical value of the resolution of the device in microinches.

⁷ The measurands stated are generated with the Fluke 5520A series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMC is expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

⁸ The measurands stated are generated with the Fluke 5700A series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMC is expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

⁹ The measurands stated are measured with the HP 3458A. This capability is suitable for the calibration of the devices intended to generate the measurand in the ranges indicated. CMC is expressed as either a specific value that covers the full range or as a combination of the fraction of the reading/output plus a range specification.

¹⁰ The CMC associated with RF Power measurement does not include mismatch.

Peter Abney