



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

WEST CALDWELL CALIBRATION LABORATORIES, INC.
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CALIBRATION

Valid To: January 31, 2014

Certificate Number: 1533.02

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

I. Acoustical Quantities

Parameter/Range	Frequency	CMC ² (±)	Comments
Acoustic Level – Measure 124 dB re 2 x 10 ⁻⁵ Pa 114 & 94 dB re 2 x 10 ⁻⁵ Pa	250 Hz 1 kHz	0.07 dB 0.09 dB	B&K 4228 B&K 4231
Acoustic Level ³ – Measure 124 dB re 2 x 10 ⁻⁵ Pa 114 & 94 dB re 2 x 10 ⁻⁵ Pa	250 Hz 1 kHz	0.12 dB 0.14 dB	B&K 4228 B&K 4231
Microphones – Measure Actuator Response	250 Hz 20 Hz to 200 kHz 20 Hz to 50 kHz	0.18 dB 0.46 dB 0.46 dB	Comparison to B&K 4134 and B&K 4144 WB 0736 & UA0033 WB 0736 & UA0023
Microphones ³ – Measure Actuator Response	250 Hz 20 Hz to 200 kHz 20 Hz to 50 kHz	0.23 dB 0.54 dB 0.54 dB	Comparison to B&K 4134 WB 0736 & UA0033 WB 0736 & UA0023

Parameter/Range	Frequency	CMC ² (±)	Comments
Acoustic Calibrators – Measure 124 dB re 2 x 10 ⁻⁵ Pa (74 to 134) dB re 2 x 10 ⁻⁵ Pa	250 Hz 31.5 Hz (63, 125, 250, 500) Hz (1, 2, 4, 8) kHz (12.5, 16) kHz	0.07 dB 0.16 dB 0.15 dB 0.15 dB	B&K 4228 & 4134 B&K 4228 & 4180
Acoustic Calibrators ³ – Measure 124 dB re 2 x 10 ⁻⁵ Pa (74 to 134) dB re 2 x 10 ⁻⁵ Pa	250 Hz 31.5 Hz (63, 125, 250, 500) Hz (1, 2, 4, 8) kHz (12.5, 16) kHz	0.12 dB 0.21 dB 0.20 dB 0.20 dB 0.20 dB	B&K 4228 & 4134 B&K 4228 & 4180
Pistonphones – Measure, (114 to 134) dB re 2 x 10 ⁻⁵ Pa	250 Hz	0.07 dB	B&K 4228 & 4134
Pistonphone ³ – Measure (114 to 134) dB re 2 x 10 ⁻⁵ Pa Acoustic Level – Measuring Equipment (94 to 114) dB re 2 x 10 ⁻⁵ Pa Acoustic Level – Measuring Equipment ³ (94 to 114) dB re 2 x 10 ⁻⁵ Pa	250 Hz 31.5 Hz (63, 125, 250, 500) Hz (1, 2, 4, 8, 12.5) kHz 16 kHz 31.5 Hz (63, 125, 250, 500) Hz (1, 2, 4, 8, 12.5) kHz 16 kHz	0.12 dB 0.17 dB 0.15 dB 0.15 dB 0.17 dB 0.22 dB 0.20 dB 0.20 dB 0.22 dB	B&K 4228 & 4134 B&K 4226 B&K 4226
Microphones – Phase	1 kHz (10 to 20) kHz	0.07° 0.08°	B&K 3560 B&K 2133
Phase ³	1 kHz (10 to 20) kHz	0.12° 0.13°	B&K 3560

Parameter/Equipment	Frequency	CMC ^{2,4} (±)	Comments
Simulated SPL Sound Level Meter Preamplifier, Measuring Amplifiers Analyzer & Filters – Measure and Measuring Equipment	10 Hz to 20 kHz 10 Hz to 50 kHz (50 to 100) kHz (100 to 250) kHz	0.08 dB 0.018 dB 0.081 dB 0.40 dB	AC voltage standard Agilent 33120A & 3458A
Simulated SPL Sound Level Meter ³ , Preamplifier, ³ Filters ³ , Analyzers ³ and Measuring Amplifiers ³ – Measuring Equipment	10 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 250) kHz	0.13 dB 0.068 dB 0.14 dB 0.45 dB	AC voltage standard Agilent 33120A & 34401A
Electrical Input Sound & Vibration Analyzer – Measure	1 kHz 10 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.022 dB 0.031 dB 0.032 dB 0.036 dB 0.084 dB 0.44 dB	AC voltage standard Agilent 33120A & 34401A
Electrical Input Sound & Vibration ³ Analyzer – Measure	1 kHz 10 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.072 dB 0.081 dB 0.082 dB 0.086 dB 0.014 dB 0.49 dB	AC voltage standard Agilent 33120A & 34401A
Dosimeters – Measuring Equipment	2 Hz to 20 kHz	0.30 dB	AC voltage standard Agilent 33120A B&K 4226
Dosimeters ³ – Measuring Equipment	2 Hz to 20 kHz	0.35 dB	AC voltage standard Agilent 33120A B&K 4226

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
DC Voltage ³ – Measure	1 mV to 1000 V	1.3 %	HP 34401A
DC Current ³ – Measure, Fixed Points	10 mA 100 mA 1 A 3 A	0.23 % 0.14 % 1.3 % 1.3 %	Agilent 34401A

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage ³ – Measure 100 mV (1 to 750) V	 10 Hz to 20 kHz (50 to 100) kHz (100 to 300) kHz 10 Hz to 20 kHz (50 to 100) kHz (100 to 300) kHz	 0.17 % 0.80 % 5.2 % 1.1 % 1.7 % 6.2 %	 Agilent 34410A

III. Electrical – RF/Microwave

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
Attenuator – Generate (0 to -60) dB (0 to -60) dB (0 to -100) dB (0 to -100) dB	 1 kHz DC to 200 kHz 10 Hz to 50 kHz 2 Hz to 200 kHz	 0.02 dB 0.32 dB 0.12 dB 0.32 dB	 WB 0785
Attenuator ³ – Generate 0 to -60) dB (0 to -60) dB (0 to -100) dB (0 to -100) dB	 1 kHz DC to 200 kHz 10 Hz to 50 kHz 2 Hz to 200 kHz	 0.07 dB 0.37 dB 0.17 dB 0.37 dB	 WB 0785

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
Attenuator – Measure 0 to -60) dB (0 to -60) dB (0 to -100) dB (0 to -100) dB	1 kHz DC to 200 kHz 10 Hz to 50 kHz 2 Hz to 200 kHz	0.042 dB 0.35 dB 0.15 dB 0.35 dB	B&K 2636, 2610
Attenuator ³ – Measure 0 to -60) dB (0 to -60) dB (0 to -100) dB (0 to -100) dB	1 kHz DC to 200 kHz 10 Hz to 50 kHz 2 Hz to 200 kHz	0.092 dB 0.40 dB 0.20 dB 0.40 dB	B&K 2636, 2610

IV. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency Measuring Equipment	DC to 10 MHz	45 µHz/Hz	Agilent 34401A
Frequency – Measure	DC to 100 MHz	41 µHz/Hz	Agilent 53131A

¹ This laboratory offers commercial calibration services and field calibration services.

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 Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ Based on using the standard at the temperature the Agilent 3458A was calibrated ($t_{cal} \pm 5 \text{ }^{\circ}\text{C}$) and an auto-calibration (ACAL) was performed within the previous 24 hours ($\pm 1 \text{ }^{\circ}\text{C}$ of ambient temperature).

⁵ In the statement of CMC, percentages are to be read as percent of reading.