SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: September 30, 2027 Certificate Number: 1568.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 8]:

I. Acoustic Quantities – Acoustic/Vibration Transducers and Acoustic Instrumentation

Parameter/Range	Frequency	CMC[2, 6] (±)	Comments
Accelerometer Sensitivity by Comparison[3, 4, 7] –			
(0.02 to 5000) pC/g (1 to 10 000) mV/g	(5 to 40) Hz 40 Hz to 2 kHz (2 to 4) kHz (4 to 7) kHz (7 to 10) kHz 160 Hz	1.3 % 1.2 % 1.3 % 1.4 % 1.9 % 1.1 %	Substitution method, Brüel & Kjær 3629
	(50 to 800) Hz, 50 m/s^2	0.5 %	Michelson interferometry ratio technique
	(>800 to 5000) Hz, frequency-dependent	0.8 %	Michelson interferometry Bessel function minimum point technique

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Parameter/Range	Frequency	CMC[2, 6, 9] (±)	Comments
Simulated Sound Pressure & Calibration of Microphone Preamplifier & Sound Level Meters[3] –			
(20 to 142) dB, re 2 × 10^{-5} Pa	(10 to 1000) Hz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.008 dB 0.008 dB 0.009 dB 0.011 dB 0.03 dB	Function generator with Agilent 3458A & capacitor
Acoustic Level – Generate[3]			
(94 to 114) dB, re 2 × 10^{-5} Pa	31.5 Hz 63 Hz (125, 250) Hz 500 Hz (1, 2) kHz 4 kHz 8 kHz 12.5 kHz 16 kHz	0.12 dB 0.11 dB 0.11 dB 0.11 dB 0.11 dB 0.11 dB 0.11 dB 0.11 dB 0.12 dB	Brüel & Kjær 4226
124 dB, re 2 × 10^{-5} Pa	250 Hz	0.12 dB	Pistonphone
Calibration of Acoustic Calibrators[3] –			
124 dB, re 2 × 10^{-5} Pa	250 Hz	0.05 dB	1-inch reference microphone, ANSI Type L
(74 to 134) dB, re 2 × 10^{-5} Pa	31.5 Hz (63, 125, 250, 500) Hz (1, 2, 4, 8) kHz (12.5, 16) kHz (125 to 4000) Hz	0.11 dB 0.1 dB 0.1 dB 0.11 dB 0.14 dB	½ inch reference microphone, IEC type LS2aP
Dynamic Force[3] –			
Up to 500 mV/N Up to 500 pC/N	160 Hz	1.5 %	UA-2223, mass pieces

Parameter/Range	Frequency	CMC[2, 6, 9] (±)	Comments
Calibration of Charge Conditioner Amplifiers & Other Charge Devices[3] –			
Up to 12 000 pC/mV	(20 to 50) Hz 50 Hz to 10 kHz (10 to 100) kHz	0.58 % 0.07 % 2.4 %	Function generator with Agilent 3458A & capacitor
Accelerometer Mounted Resonance Amplitude Response[3] –			
(-20 to 50) dB	200 Hz to 20 kHz (20 to 30) kHz	1.3 dB 3.7 dB	Brüel & Kjær analyzer
Accelerometer Mounted Resonance Frequency[3]	200 Hz to 50 kHz	2.3 %	Brüel & Kjær analyzer
Vibration – Measure[3]	(9.807 to 10) m/s^2 at 79.6 Hz & 159.2 Hz	1.1 %	Brüel & Kjær 3629
Microphone Sensitivity[3] –			
(-100 to 6) dB, re 1 V/Pa	250 Hz 1000 Hz	0.07 dB 0.07 dB	1-inch reference microphone, ANSI Type L of ½ inch reference microphone, IEC type LS2aP with comparison coupler WA0817
Microphone Electrostatic Response[3] –			
Amplitude Range (10 to -40) dB	(20 to 30) Hz 30 Hz to 20 kHz (20 to 80) kHz (80 to 100) kHz (100 to 200) kHz	0.12 dB 0.15 dB 0.24 dB 0.36 dB 0.49 dB	Brüel & Kjær analyzer

II. Electrical – DC/Low Frequency

Parameter/Range	Frequency	CMC[2, 5, 6] (±)	Comments
AC Voltage – Measure[3]			
(6 to 10) 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	0.12 % 0.094 % 0.12 % 0.2 % 0.6 % 4.2 %	Agilent 3458A
(0.01 to 0.1) 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 (0.3 to 1) MHz	0.033 % 0.028 % 0.035 % 0.052 % 0.11 % 0.36 % 1.2 %	
(0.1 to 1) 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 (0.3 to 1) MHz	0.021 % 0.014 % 0.021 % 0.042 % 0.092 % 0.35 % 1.1 %	
(1 to 10) 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 (0.3 to 1) MHz	0.021 % 0.014 % 0.021 % 0.041 % 0.091 % 0.34 % 1.1 %	
(10 to 100) V	(10 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.028 % 0.027 % 0.029 % 0.048 % 0.14 %	
(100 to 1000) V	40 Hz to 1 kHz	0.23 %	

Parameter/Range	Frequency	CMC[2, 5, 6] (±)	Comments
AC Voltage – Generate[3]			
(0.006 to 0.01) V	(10 to 20 000) Hz	0.77 % (absolute) 0.36 % (relative)	Brüel & Kjær 1051 generator monitored by Agilent 3458
(0.01 to 5) V	(10 to 20 000) Hz	0.75 % (absolute) 0.35 % (relative)	
(0.12 to 1.2) mV	(0.4 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 200) kHz	0.064 % 0.067 % 0.08 % 0.12 % 0.46 %	Sine source, Agilent 3458 & inductive divider
(1.2 to 12) mV	(0.4 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 200) kHz	0.061 % 0.063 % 0.075 % 0.11 % 0.46 %	
(12 to 100) mV	(0.4 to 1) kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 200) kHz	0.083 % 0.087 % 0.14 % 0.18 % 0.49 %	

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
DC Voltage – Measure[3]	Up to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V	13 µV/V 10 µV/V 14 µV/V 23 µV/V	Agilent 3458A opt 002
DC Voltage – Measuring Equipment[3]	Up to 0.045 V (0.045 to 0.3) V (0.3 to 0.45) V (0.45 to 3) V (3 to 4.5) V (4.5 to 30) V (40 to 75) V	5 µV 23 µV 38 µV 0.23 mV 0.37 mV 2.3 mV 5.2 mV	Burster 4462

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
DC Voltage – Generate[3]	(0.001 to 0.1) V (>0.1 to 1) V (>1 to 10) V (>10 to 100) V	$35 \times 10^{-6} \times U + 8$ µV $35 \times 10^{-6} \times U + 11$ µV $35 \times 10^{-6} \times U + 60$ µV $50 \times 10^{-6} \times U + 1000$ µV	Keithley 2750, U = Measured value in V
DC Current – Measuring Equipment[3]	(0.002 to 0.0075) A (0.0075 to 0.052) A	1.6 µA 8.6 µA	Burster 4462
DC Resistance – Measuring Equipment[3]	(16 to 400) Ω (>400 to 2000) Ω (>2000 to 10 000) Ω	12 mΩ 80 mΩ 950 mΩ	Burster 4530
DC Voltage Ratio – Measuring Equipment[3]			
DC Bridge Voltage: 1.0 V	± 2 mV/V ± 5 mV/V ± 10 mV/V ± 20 mV/V ± 100 mV/V ± 1000 mV/V	0.5 µV/V 0.5 µV/V 1.0 µV/V 1.5 µV/V 15 µV/V 150 µV/V	HBM K148S31
DC Bride Voltage: (>1 to 10) V	± 2 mV/V ± 5 mV/V ± 10 mV/V ± 20 mV/V ± 100 mV/V ± 1000 mV/V	0.3 µV/V 0.6 µV/V 1.2 µV/V 2.4 µV/V 12 µV/V 150 µV/V	
DC Bridge Voltage: (>1 to 2.5) V	± 2 mV/V ± 5 mV/V ± 10 mV/V ± 20 mV/V ± 100 mV/V	2 µV/V 2 µV/V 2 µV/V 5 µV/V 10 µV/V	
DC Bridge Voltage: (>2.5 to 5.0) V	± 2.5 mV/V ± 5 mV/V ± 10 mV/V	2 µV/V 3 µV/V 5 µV/V	
Quarter-& Half-Bridge			
DC Bridge Voltage: 1.0 V	± 10 mV/V ± 20 mV/V ± 100 mV/V	5 µV/V 5 µV/V 20 µV/V	Burster 4462, Keithley 2750

Parameter/Frequency	Range	CMC[2, 5] (±)	Comments
AC Voltage Ratio – Measuring Equipment[3]			HBM K148S31
(600 to 1250) Hz	± 5 mV/V ± 10 mV/V ± 20 mV/V ± 100 mV/V	0.5 µV/V 1 µV/V 1.5 µV/V 15 µV/V	Square wave bridge voltage: 1 V
	± 2 mV/V ± 5 mV/V ± 10 mV/V ± 20 mV/V	0.3 µV/V 0.6 µV/V 1.2 µV/V 2.4 µV/V	Square wave bridge voltage: (>1 to 5) V
4.8 kHz	± 2 mV/V ± 10 mV/V ± 100 mV/V ± 1000 mV/V	0.5 µV/V 2 µV/V 15 µV/V 120 µV/V	Bridge voltage: 1 V
	± 2 mV/V ± 5 mV/V ± 10 mV/V ± 100 mV/V	0.4 µV/V 2 µV/V 2 µV/V 15 µV/V	Bridge voltage: 2.5 V
	± 2 mV/V	0.4 µV/V	Bridge voltage: 5 V
600 Hz	± 2 mV/V ± 5 mV/V ± 10 mV/V	0.1 µV/V 0.2 µV/V 1 µV/V	Bridge voltage: 2.5 V
	± 2 mV/V ± 5 mV/V	0.1 µV/V 0.2 µV/V	Bridge voltage: 5 V
225 Hz	± 2 mV/V ± 5 mV/V ± 10 mV/V	0.06 µV/V 0.08 µV/V 2 µV/V	Bridge voltage: 2.5 V, BN100A/BN100R
	± 2 mV/V ± 5 mV/V	0.04 µV/V 0.06 µV/V	Bridge voltage: 5 V, BN100A/BN100R

Parameter/Equipment	Range	CMC[2] (±)	Comments
Indicators for Resistance Thermometers (PT 100)[3]	(-100 to 200) °C (>200 to 500) °C (>500 to 800) °C	0.02 °C 0.03 °C 0.04 °C	Electrical stimulation of sensor signal temperature equivalent in Ω according to DIN EN 60751:2009, Burster 4530
Indicators for Resistance Thermometers (PT 1000)[3]	(-100 to 200) °C (>200 to 500) °C (>500 to 800) °C	0.02 °C 0.09 °C 0.12 °C	Electrical stimulation of sensor signal temperature equivalent in Ω according to DIN EN 60751:2009, Burster 4530
Indicators for Thermocouples Type K[3]	(-100 to 800) °C (>800 to 1300) °C	0.12 °C 0.3 °C	Electrical stimulation of sensor signal temperature equivalent in V; Burster 4462, 4485 (with regard to reference function temperature 0 °C) According to DIN EN 60584:2014
Indicators for Thermocouples Type T[3]	(>200 to 400) °C	0.12 °C	Electrical stimulation of sensor signal temperature equivalent in V; Burster 4462, 4485 (with regard to reference function temperature 0 °C) According to DIN EN 60584:2014

III. Electrical – RF/Microwave

Parameter/ Range	Frequency	CMC[2, 9] (±)	Comments
Attenuation – Measure[3]			
(0 to 71) dB	1000 Hz	0.026 dB (absolute) 0.023 dB (relative)	Brüel & Kjær WB 0785 attenuator with function generator
	DC to 20 kHz	0.037 dB (absolute) 0.035 dB (relative)	

IV. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Torque Transducers	(20 to 200) N·m (100 to 1000) N·m (0.2 to 2) kN·m (1 to 10) kN·m	0.12 % 0.042 % 0.11 % 0.035 %	HBM direct comparison system

IV. Time & Frequency

Parameter/Equipment	Range	CMC[2, 9] (±)	Comments
Frequency – Measure[3]	(10 to 100) Hz (0.1 to 100) kHz (0.1 to 1) MHz (1.0 to 2) MHz	6 µHz/Hz 3 µHz/Hz 3 µHz/Hz 8 µHz/Hz	Agilent 5315A

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

[2] Calibration and Measurement Capability Uncertainty (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. CMCs 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. 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] In the statement of Range, pC is the unit of charge in pico Coulombs; g is the acceleration due to gravity, where 1.0 g is the standard acceleration at sea level.

[5] The measurands stated are generated using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure the measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification.

[6] In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.

[7] Field calibration service is not available using interferometry calibration methods.

[8] This scope meets A2LA's *P112 Flexible Scope Policy.*

[9] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

Accredited Laboratory

A2LA has accredited

HOTTINGER BRUEL & KJAER INC.

Duluth, GA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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*).

Presented this 4th day of September 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1568.01
Valid to September 30, 2027

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