



**National Voluntary
Laboratory Accreditation Program**



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION LABORATORIES

NVLAP LAB CODE 200625-0

NVLAP Code: 20/A01 ANSI/NCSL Z540-1-1994; Part 1 Compliant

NVLAP Code: 20/E05
 DC Current

<i>Signal Level Range</i>	<i>Best Uncertainty (±) (% of reading + % of range) ^{notes 1, 4}</i>	<i>Remarks</i>
1 mA to 10 mA	0.1 + 0.02	34401A
10 mA to 100 mA	0.12 + 0.005	34401A
100 mA to 1 mA	0.25 + 0.01	34401A
1 A to 3 A	0.2 + 0.02	34401A

DC Resistance (4-wires)

<i>Signal Level Range</i>	<i>Best Uncertainty (±) (% of reading + % of range) ^{notes 1, 4}</i>	<i>Remarks</i>
1 mΩ to 100 Ω	0.1 + 0.006	34401A
100 Ω to 1 MΩ	0.1 + 0.004	34401A

2009-04-01 through 2010-03-31

Effective dates

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NVLAP Code: 20/E06

DC Voltage

Signal Level Range	Best Uncertainty (\pm) (% of reading + % of range) ^{notes 1, 4}	Remarks
1 mV to 100 mV	0.0055 + 0.0035	34401A
100 mV to 1 V	0.0046 + 0.0007	34401A
1 V to 10 V	0.0042 + 0.0005	34401A
10 V to 100 V	0.005 + 0.0006	34401A
100 V to 1000 V	0.005 + 0.0010	34401A

NVLAP Code: 20/E09

AC Voltage

Measuring equipment: generate

Signal Level Range	Frequency Domain	Frequency Best Uncertainty (\pm) ^{notes 1, 4}	Level Best Uncertainty (\pm) ^{notes 1, 4}	Remarks
10 μ V _{pp} to 40 V _{pp}	0.001 Hz to 200 kHz	54 ppm + 4 mHz	1.1	SR DS360 Generate: Sine Square, two-tone
10 μ V _{pp} to 40 V _{pp}	0.001 Hz to 200 kHz ON: 1/2, 1 to 65534 periods Rep. Rate 1 to 65535 Off atten to 10 kHz: >70 dB	54 ppm + 4 mHz	1.1	SR DS360 Generate: Sine or square bursts

AC Voltage: true RMS

Range	Frequency Domain	Best Uncertainty (\pm) ^{notes 1, 4}	Remarks
50 μ V to 1 mV	20 Hz to 20 kHz	0.2 dB	N-1504A System
	3 Hz to 100 kHz	0.3 dB	N-1504A System

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Range	Frequency Domain	Best Uncertainty (\pm)(% of reading + % of range) <small>notes 1, 4</small>	Remarks
1 mV to 100 mV	3 Hz to 5 Hz	1.00 + 0.04	34401A
	5 Hz to 10 Hz	0.37 + 0.04	34401A
	10 Hz to 20 kHz	0.13 + 0.04	34401A
	20 kHz to 50 kHz	0.17 + 0.05	34401A
	50 kHz to 100 kHz	0.62 + 0.08	34401A
	100 kHz to 300 kHz	4.0 + 0.50	34401A
100 mV to 750 V	3 Hz to 5 Hz	1.00 + 0.03	34401A
	5 Hz to 10 Hz	0.37 + 0.03	34401A
	10 Hz to 20 kHz	0.13 + 0.03	34401A
	20 kHz to 50 kHz	0.16 + 0.05	34401A
	50 kHz to 100 kHz	0.62 + 0.08	34401A
	100 kHz to 300 kHz	4.0 + 0.50	34401A

Self Generated Noise	Frequency Domain	Best Uncertainty (\pm) in dB <small>notes 1, 4</small>	Remarks
1 μ V to 10 V	0.1 Hz to 20 kHz	0.85	840 RTA
>30 μ V	20 Hz to 80 kHz	2	HP 8903A

Parameter Range	Frequency Domain	Signal Level Range	Best Uncertainty (\pm) <small>notes 1, 4</small>	Remarks
Signal distortion >0.1%	6 Hz to 20 Hz	100 mV to 10 V	0.05% distortion	Analyzer Method
>0.01%	20 kHz to 100 kHz	50 mV to 300 V	2 dB	HP 8903A
Signal to noise ratio <80 dB	50 Hz to 100 kHz	50 mV to 300 V	1 dB	HP 8903A

TIME & FREQUENCY

NVLAP Code: 20/F01

Frequency dissemination: Frequency and period

Signal Level Range	Frequency Domain	Best Uncertainty (\pm) in % of reading <small>notes 1, 4</small>	Remarks
100 mV to 750 V	3 Hz to 5 Hz	0.1	34401A
	5 Hz to 10 Hz	0.05	34401A
	10 Hz to 40 Hz	0.03	34401A

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40 Hz to 300 kHz

0.01

34401A

<i>Parameter Range</i>	<i>Best Uncertainty (\pm)</i> ^{notes 1, 4}	<i>Remarks</i>
Time intervals >8s	1 s	Chronometer

MECHANICAL

NVLAP Code: 20/M01

Acoustic

Sensitivity or open circuit sensitivity: direct and comparison methods

<i>Range</i>	<i>Frequency Domain in Hz</i>	<i>Best Uncertainty (\pm) in dB</i> ^{notes 1, 3}	<i>Remarks</i>
-70 dB to <-50 dB re 1 V/Pa (0.3 mV/Pa to 3 mV/Pa)	250	0.12	Comparison and direct
-50 dB to 0 dB re 1 V/Pa (3 mV/Pa to 1 V/Pa)	250	0.09	Comparison and direct
-70 dB to <-50 dB re 1 V/Pa (0.3 mV/Pa to 3 mV/Pa)	1 k	0.13	Comparison
-50 dB to 0 dB re 1 V/Pa (3 mV/Pa to 1 V/Pa)	1 k	0.11	Comparison

Frequency Response: electrostatic excitation (applicable for condenser microphones with removable grid)

<i>Range</i>	<i>Frequency Domain in Hz</i>	<i>Best Uncertainty (\pm) in dB</i> ^{notes 1, 4}		<i>Remarks</i>
		<i>Actuator response</i>	<i>Free-field and diffuse field responses</i> ^{note 2}	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	31.5 to 100	0.20	0.20	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>100 to 1.25 k	0.14	0.18	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>1.25 k to 4 k	0.14	0.23	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>4 k to 8 k	0.17	0.45	
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>8 k to 10 k	0.38	0.57	

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-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>10 k to 16 k	0.38	0.77
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>16 k to 20 k	0.59	0.89
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>20 k to 50 k	0.8	2.1
-70 dB to 0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	>50 k to 100 k	1.1	4.2

Frequency Response: acoustical method

Microphone Sensitivity Range	Frequency Domain in Hz	Best Uncertainty (\pm) in dB ^{notes 1, 4}		Remarks
		<i>Pressure response</i>	<i>Free-field and diffuse field responses ^{note 2}</i>	
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	31.5	0.3	0.3	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	63	0.14	0.24	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	125	0.14	0.24	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	250	0.09	0.15	1253 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	500	0.14	0.16	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	1k	0.11	0.13	1253 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	2 k	0.14	0.24	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	4 k	0.14	0.32	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	8 k	0.14	0.51	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	12.5 k	0.14	1.00	4226 Calibrator
-70 dB to <0 dB re 1 V/Pa (0.3 mV/Pa to 1 V/Pa)	16 k	0.21	1.45	4226 Calibrator

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Acoustical Calibrators and Pistonphones

Sound pressure level (SPL)

<i>SPL Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in dB</i> ^{note 1}	<i>Remarks</i>
90 dB to 170 dB re 20 µPa	31.5 Hz (± 2 Hz)	0.40	Comparison
	63 Hz to 800 Hz	0.10	Direct Method
	250 Hz (± 10 Hz)	0.095 ^{note 3}	Direct Method
	250 Hz (± 10 Hz)	0.092 ^{note 4}	Direct Method
	1 kHz (± 40 Hz)	0.11 ^{note 3}	Direct Method
	1 kHz (± 40 Hz)	0.10 ^{note 4}	Direct Method
	1250 Hz to 5 kHz	0.11	Direct Method
	6.3 kHz to 8 kHz	0.14	Direct Method
	10 kHz to 12.5 kHz	0.16	Direct Method
	16 kHz	0.21	Direct Method

Sound Frequency

<i>Range</i>	<i>SPL Domain</i>	<i>Best Uncertainty(±)(% of reading)</i> ^{notes 1, 4}	<i>Remarks</i>
10 Hz to 40 Hz	70 dB to 170 dB re 20 µPa	0.03	34401A
40 Hz to 20 kHz	70 dB to 170 dB re 20 µPa	0.01	34401A

Frequency Stability

<i>Stability Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty(±) in %</i> ^{notes 1, 4}	<i>Remarks</i>
>0.01%	10 Hz to 20 kHz	5% of the measured values	

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Sound Distortion

<i>Distortion Range</i>	<i>Frequency Domain</i>	<i>Sound Pressure Level Domain</i>	<i>Best Uncertainty (±) in % distortion</i> ^{notes 1, 4}	<i>Remarks</i>
>0.1%	10 Hz to 20 kHz	50 dB to 170 dB re 20 µPa	0.1	Analyzer Method

Sound Level Meters, Dosimeters, Real-time and FFT analyzers, Filter sets
Acoustical Tests
Sound Pressure Level: fixed points, tones

<i>SPL Range in dB</i>	<i>Frequency Domain in Hz</i>	<i>Best Uncertainty (±) in dB</i> ^{note 1}		<i>Remarks</i>
		<i>Pressure Response</i>	<i>Free-field and diffuse field responses</i> ^{note 2}	
94, 104, 114	31.5	0.3	0.3	4226 Calibrator
94, 104, 114	63	0.14	0.23	4226 Calibrator
94, 104, 114	125	0.14	0.23	4226 Calibrator
94, 104, 114	250	0.14	0.15	4226 Calibrator
124	250	0.09	0.11	1253 Calibrator
94, 104, 114	500	0.14	0.15	4226 Calibrator
94, 104, 114	1 k	0.13	0.13	4226 Calibrator
124	1 k	0.12	0.13	1253 Calibrator
94, 104, 114	2 k	0.14	0.23	4226 Calibrator
94, 104, 114	4 k	0.14	0.32	4226 Calibrator
94, 104, 114	8 k	0.14	0.50	4226 Calibrator
94, 104, 114	12.5 k	0.14	1.00	4226 Calibrator
94, 104, 114	16 k	0.3	1.45	4226 Calibrator

Tone Burst Sounds

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<i>SPL Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in dB</i> ^{note 1}	<i>Remarks</i>
80 dB to 100 dB re 20 µPa	2 kHz	0.15	4226 Calibrator

Timed sounds
Measuring Equipment (generate)

<i>SPL Range in dB</i>	<i>Frequency Domain in kHz</i>	<i>Best Uncertainty (±) in % dose</i> ^{note 1}	<i>Remarks</i>
94	1	0.01	
104	1	0.03	
114	1	0.12	
124	1	0.26	

NVLAP Code: 20/M11
Vibration

Exciters and Vibration Calibrators
Acceleration: measure

<i>Level Range</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (±) in %</i> ^{note 1, 4}	<i>Remarks</i>
0.1 m/s ² to 200 m/s	40 Hz to 400 Hz	1.2	
0.1 m/s ² to 200 m/s	20 Hz to 5 kHz	1.8	
0.1 m/s ² to 200 m/s	>5 kHz to 10 kHz	3.0	
0.1 m/s ² to 200 m/s	10 Hz to 16 Hz	12	

Motion Frequency

<i>Range in Hz</i>	<i>Acceleration Domain</i>	<i>Best Uncertainty (±) in % of reading</i> ^{notes 1, 4}	<i>Remarks</i>
3 to 5	0.01 m/s ² to 200 m/s ²	0.16	33401A
>5 to 10	0.01 m/s ² to 200 m/s ²	0.18	33401A
>10 to 40	0.01 m/s ² to 200 m/s ²	0.20	33401A
>40 to 100	0.01 m/s ² to 200 m/s ²	0.06	33401A
>100 to 300	0.01 m/s ² to 200 m/s ²	0.03	33401A
>300 to 10 k	0.01 m/s ² to 200 m/s ²	0.01	33401A

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Distortion of Motion

<i>Distortion Range</i>	<i>Frequency Domain</i>	<i>Vibration Level Domain</i>	<i>Best Uncertainty (\pm) in distortion %</i> ^{notes 1, 4}	<i>Remarks</i>
>0.1%	10 Hz to 10 kHz	0.1 m/s ² to 200 m/s ²	0.1	Analyzer Method

Accelerometers

Accelerometer sensitivity: comparison method

<i>Range Charge</i>	<i>Frequency Domain</i>	<i>Best Uncertainty (\pm) in %</i> ^{notes 1, 4}	<i>Remarks</i>
	10 Hz	12.0	
	12.5 Hz	7.2	
	16 Hz	3.7	
	20 Hz to 13.5 Hz	1.6	
	40 Hz to 400 Hz	0.9	
	>400 Hz to 5 kHz	1.3	
	>5 kHz to 10 kHz	2.9	
<i>Voltage</i>			
	10 Hz	12.0	
	12.5 Hz	7.3	
	16 Hz	3.7	
	20 Hz to 31.5 Hz	1.7	
	40 Hz to 400 Hz	1.1	
	>400 Hz to 5 kHz	1.4	
	>5 kHz to 10 kHz	2.9	

1. Represents an expanded uncertainty using a coverage factor $k = 2$, at an approximate level of confidence of 95%.
2. These characteristics are calculated using the measured actuator/pressure response and the correction coefficients provided by the manufacturer of the tested device.
3. At reference conditions.
4. At actual conditions.

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