



# Odin Metrology, Inc.

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Calibration data for  
**Brüel & Kjær Handheld Analyzer**  
**Type 2250# 2505945, ID# N/A**  
With Microphone 4189# 2508686 and Preamplifier ZC0032# 3745  
Performed on June 1, 2021  
for  
Odin Metrology, Inc.

PO#: N/A  
Certificate#: OM2021-1  
Calibration performed by: HL

Environmental Conditions  
Relative humidity: 42%  
Ambient temperature: 23°C  
Ambient pressure: 988.93 hPa

The following calibration was performed per ACCT Procedure 2250-Light-2270 version 3.2.1.  
The data represent both the "As Found" and the "As Left" conditions.

Page No.	Test	IEC Section	Result
<b>Sound Level Meter (IEC 61672 Class 1)</b>			
3	Internal Clock	Reference Only	See Data
3	Sensitivity Verification with Acoustic Calibrator	3 § 9	See Data
3	Acoustic Frequency Response with Microphone	3 § 11	Pass
3	Self-Generated Noise	3 § 10	See Data
4	Output Impedance with Shorted Output	2 § 9.18	Pass
4	AC Full Scale Output Voltage	Reference Only	See Data
4	DC Full Scale Output Voltage	Reference Only	See Data
4	Reset	2 § 9.17	Pass
4	Overload Indication	3 § 18	Pass
5	DC Linearity	Reference Only	See Data
5	Peak-C Sound Level	3 § 17	Pass
5	Decay Time Constants	2 § 9.11	Pass
6	Difference in Indication	3 § 13	Pass
	Frequency Response	3 § 12	
6	A-Weighted		Pass
7	C-Weighted		Pass
8	Z-Weighted		Pass
	Single Toneburst Response (Fast)	3 § 16	
9	A-Weighted		Pass
9	C-Weighted		Pass
10	Z-Weighted		Pass
	Single Toneburst Response (Slow)	3 § 16	
10	A-Weighted		Pass
10	C-Weighted		Pass
11	Z-Weighted		Pass
11	SEL Response to Repeated Tonebursts	1 § 5.9	Pass
12	Level Linearity	3 § 14, 1 § 5.5.6	Pass
<b>RTA Octave Filter (IEC 61260 Class 0)</b>			
	Level Verification of Filter+SLM	Reference Only	
14	1/1 Octave		Pass
14	1/3 Octave		Pass
	Filter Check	Reference Only	
15	1/1 Octave		Pass
15	1/3 Octave		Pass
16	Relative Attenuation (1/1 Octave)	§ 5.3	Pass

The expanded uncertainties stated in this document are the maximum expanded uncertainties permitted by IEC 61672-1. Odin Metrology's actual expanded uncertainties are less than or equal to the values stated herein.





**DC Linearity**

The sound level meter is set up to indicate full-scale on the display and the DC-output voltage is recorded in decreasing 10-dB steps.

Rel. Input Level: the level (amplitude) of the signal to the sound level meter relative to the reference of full-scale

Data Found: the measured DC-output from the SLM

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor  $k=2$ )

Sensitivity: the calculated sensitivity based on the DC-outputs at the highest and lowest levels indicated

Rel. Input Level (dB)	Data Found (mV)	Uncertainty (mV)	Sensitivity (mV/dB)
0.0	2808.17		20.07
-10.0	2606.66		
-20.0	2407.12		
-30.0	2206.25		
-40.0	2005.31	0.40	
-50.0	1804.58		
-60.0	1604.17		
-70.0	1403.42		
-80.0	1203.16		
-90.0	1001.79		
-100.0	801.94		
-110.0	604.16	0.05	
-120.0	424.17		

**Peak-C Sound Level (IEC 61672-3 §17)**

The sound level meter's peak-C response to single one-cycle and positive- and negative-going half-cycle sinusoidal signals is measured.

Input Level: the steady-state level (amplitude) of the signal to the sound level meter from which the one- and half-cycle signals are extracted

Cycles in Test Signal: the type of burst used (one period, positive half period, or negative half period)

Frequency: the frequency of the signal to the sound level meter

Nominal Value: what the sound level meter should indicate according to IEC 61672

Tolerance: the acceptable difference from nominal, including the stated uncertainty, for what the sound level meter should indicate

$L_{Cpeak}$  Found: the peak-C sound level value indicated on the sound level meter

Data Found: the difference between the peak-C sound level and the steady-state C-weighted sound level as indicated by the sound level meter ( $L_{Cpeak}-L_C$ )

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor  $k=2$ )

Deviation: the difference between the nominal value and the data found

Input Level (dB C)	Cycles in Test Signal	Frequency (Hz)	Nominal Value (dB)	Tolerance ( $\pm$ dB)	$L_{Cpeak}$ Found (dB)	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
	One	8,000.00	3.40	2.00	135.39	3.39		-0.01	Pass
132.00	Positive 1/2	500.00	2.40	1.00	134.03	2.03	0.40	-0.37	Pass
	Negative 1/2				134.07	2.07		-0.33	Pass

**Decay Time Constants for Time Weightings Fast and Slow (IEC 61672-2 § 9.11)**

The decay rate of the display value on the sound level meter is measured after a steady 4.0 kHz signal is removed.

Time Weighting: the time weighting setting on the sound level meter

Nominal Rate: the decay rate the sound level meter should exhibit according to IEC 61672

Tolerance: the acceptable range, including the stated tolerance, for what the sound level meter should indicate according to IEC 61672

Measured Rate: the actual decay rate measured on the sound level meter

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor  $k=2$ )

Deviation: the difference between the nominal value and the data found

Time Weighting	Nominal Rate (dB/s)	Tolerance (dB/s)		Measured Rate (dB/s)	Uncertainty (dB/s)	Deviation (dB/S)	Pass/Fail
		Minimum	Maximum				
Fast	N/A	27.00	N/A	40.89	2.00	N/A	Pass
Slow	4.35	3.80	4.90	4.60	0.40	0.25	Pass

**Difference in Indication (IEC 61672-3 § 13)**

With reference to fast time weighting and A frequency weighting at the SLM reference level indicated, the measurements of all other frequency weighting parameters and all other time weighting parameters may not differ by more than the specified tolerance.

Time Weighting: time weighting setting on the SLM

Frequency Weighting: frequency weighting setting on the SLM

Input Level: the level (amplitude) of the signal to the sound level meter

Nominal Value: the value the sound level meter should indicate according to IEC 61672

Tolerance: the acceptable difference from nominal, including the stated uncertainty, for what the sound level meter should indicate

Data Found: the value the sound level meter actually indicates

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor  $k=2$ )

Deviation: the difference between the nominal value and the data found

Time Weighting	Frequency Weighting	Input Level (dB)	Nominal Value (dB)	Tolerance ( $\pm$ dB)	Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
	A		<b>Reference</b>				<b>Reference</b>	
Fast	C	94.0	94.0	0.2	93.98	0.1	-0.02	Pass
	Z				93.98		-0.02	Pass
Slow	A				93.98		-0.02	Pass
	C				93.98		0.1	-0.02
	Z				93.98		-0.02	Pass

**A-Frequency-Weighted Frequency Response (61672-3 § 12)**

The sound level meter's frequency response is recorded by varying the frequency as specified. The reference level is 45 dB less than full scale at 1.0 kHz.

Frequency: the frequency of the signal to the sound level meter

Nominal Value: the value the sound level meter should indicate according to IEC 61672 (this is relative to the reference value at 1.0 kHz)

Tolerance: the acceptable range, including the stated uncertainty, for what the sound level meter should indicate according to IEC 61672

Data Found: the value the sound level meter actually indicates

Uncertainty: maximum expanded uncertainty of measurement with approximately 95% confidence level (coverage factor  $k=2$ )

Deviation: the difference between the nominal value and the data found

Frequency (Hz)	Nominal Value (dB)	Tolerance (dB)		Data Found (dB)	Uncertainty (dB)	Deviation (dB)	Pass/Fail
		Minimum	Maximum				
10.0	-70.4	N/A	-67.4	-68.73		1.70	Pass
12.6	-63.4	N/A	-60.9	-63.10		0.27	Pass
15.8	-56.7	-60.7	-54.7	-56.66		0.03	Pass
20.0	-50.5	-52.5	-48.5	-50.45		0.00	Pass
25.1	-44.7	-46.2	-42.7	-44.78		-0.08	Pass
31.6	-39.4	-40.9	-37.9	-39.47		-0.03	Pass
39.8	-34.6	-35.6	-33.6	-34.67	0.50	-0.04	Pass
50.1	-30.2	-31.2	-29.2	-30.17		0.06	Pass
63.1	-26.2	-27.2	-25.2	-26.19		0.00	Pass
79.4	-22.5	-23.5	-21.5	-22.50		0.00	Pass
100.0	-19.1	-20.1	-18.1	-19.12		0.02	Pass
125.9	-16.1	-17.1	-15.1	-16.08		0.02	Pass
158.5	-13.4	-14.4	-12.4	-13.32		0.03	Pass
199.5	-10.9	-11.9	-9.9	-10.81		0.06	Pass
251.2	-8.6	-9.6	-7.6	-8.58		0.05	Pass
316.2	-6.6	-7.6	-5.6	-6.55		0.06	Pass
398.1	-4.8	-5.8	-3.8	-4.76	0.40	0.05	Pass
501.2	-3.2	-4.2	-2.2	-3.17		0.06	Pass
631.0	-1.9	-2.9	-0.9	-1.83		0.07	Pass
794.3	-0.8	-1.8	0.2	-0.76		0.06	Pass
1,000.0	0.0				<b>Reference</b>		
1,258.9	0.6	-0.4	1.6	0.66	0.40	0.07	Pass
1,584.9	1.0	0.0	2.0	1.05		0.07	Pass
1,995.3	1.2	0.2	2.2	1.28		0.08	Pass
2,511.9	1.3	0.3	2.3	1.35		0.08	Pass
3,162.3	1.2	0.2	2.2	1.29		0.09	Pass
3,981.1	1.0	0.0	2.0	1.06	0.60	0.09	Pass
5,011.9	0.5	-1.0	2.0	0.66		0.11	Pass
6,309.6	-0.1	-2.1	1.4	0.00		0.12	Pass
7,943.3	-1.1	-3.6	0.4	-1.02		0.09	Pass
10,000.0	-2.5	-5.5	-0.5	-2.52		-0.03	Pass
12,589.3	-4.3	-9.3	-2.3	-4.68		-0.36	Pass
15,848.9	-6.6	-22.6	-4.1	-7.42	1.00	-0.82	Pass
19,952.6	-9.3	N/A	-6.3	-8.84		0.48	Pass





















