

Certificate of Calibration for Brüel & Kjær Sound Level Calibrator

This calibration is performed by comparison with measurement reference standard pistonphones:

Type No.	4228	4228
Serial No.	1793011	1504084
Calibrated by	TE	TE
Cal Date	24 NOV 2020	24 NOV 2020
Due Date	24 NOV 2021	24 NOV 2021

- a) Estimated uncertainty of comparison: ± 0.05 dB
- b) Estimated uncertainty of calibration service for standard pistonphone: ± 0.06 dB
- c) Total uncertainty: $\sqrt{a^2 + b^2} = \pm 0.08$ dB
- d) Expanded uncertainty (coverage factor $k = 2$ for 95% confidence level): $= \pm 0.16$ dB

This acoustic calibrator has been calibrated using standards with values traceable to the National Institute of Standards and Technology. This calibration is traceable to NIST Test Number **683/289533-17**.

Calibrator type **4231**
 Serial no. **1839105**
 Submitted by **Odin Metrology, Inc.**
 Thousand Oaks, CA 91320
 Purchase order no. **N/A**
 Asset no. **Cal. Lab.**

This calibrator has been found to perform **within** the specifications listed below at the normalized conditions stated.

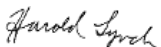
SPL produced in coupler terminated by a loading volume of 1.333 cm ³	94.0 \pm 0.2 dB
Level Step	20 \pm 0.1 dB
Frequency	1,000 Hz \pm 0.1%
Distortion	< 1%
At 1,013 hPa, 20°C, and 65% relative humidity	

CONDITION OF TEST		
Ambient Pressure	989.61	hPa
Temperature	23	°C
Relative Humidity	41	%
Date of Calibration	18 MAY 2021	
Re-calibration due on	18 MAY 2022	

PERFORMANCE AS RECEIVED		
Frequency	999.8	Hz
SPL	94.00	dB
SPL+20 dB	113.98	dB
Distortion	0.3	%
Battery Voltage	1.49	V

The calibration of this acoustic calibrator was performed using a test system conforming to the requirements of ANSI/NC SLZ540-1, 1994, ISO 17025, and ISO 9001:2015, Certification NQA No. 11252.

Calibration procedure: **OM-P-1001-Acoustic_Calibrator, Rev. 1.0 20130522.**

Calibration performed by 

Harold Lynch, Service Manager

Was repair or adjustment performed? **No**
 Were parts replaced? **No**
 Were batteries replaced? **Yes**

FINAL PERFORMANCE		
Frequency	999.8	Hz
SPL	94.00	dB
SPL+20 dB	113.98	dB
Distortion	0.3	%

Note: This calibrator was **within** manufacturer's specifications as received.

ODIN METROLOGY, INC.
 3533 OLD CONEJO ROAD, SUITE 125
 THOUSAND OAKS, CA 91320
 PHONE: (805) 375-0830; FAX: (805) 375-0405

Instrumentation used for calibration of pistonphones and calibrators

<u>Instrument Type</u>	<u>Type no.</u>	<u>Serial no.</u>	<u>Cal. Date</u>	<u>Cal. Due</u>	<u>Cal. by</u>
Precision Barometer	Druck 141	299/95-10	07 DEC 2020	07 DEC 2021	CMI
Measuring Amplifier	2113	486832	06 JUN 2020	06 JUN 2021	HL
Transducer Assembly	9545	390093	29 OCT 2020	29 OCT 2022	TE
Pistonphone	4228	1793011	24 NOV 2020	24 NOV 2021	TE
Pistonphone	4228	1504084	24 NOV 2020	24 NOV 2021	TE
Sound Calibrator	4231	2402593	03 FEB 2021	03 FEB 2022	HL
Microphone	4134	1315901	24 MAR 2021	24 MAR 2022	TE
HP Multimeter	34401A	MY41031678	06 JAN 2021	06 JAN 2022	PMI
HP Multimeter	34401A	3146A48348	08 OCT2020	08 OCT 2021	PMI

Calibration of reference microphones 4160 serial numbers 991820, 991821, 1054926, standard pistonphones 4220 serial numbers 1048473, 1510240, 375837, 1476021 and 4228 serial number 1793011 are calibrated traceable to NIST with NIST test number **683/289533-17**.

The verification/calibration listed on page 1 of this document was performed on a test system which conforms to and operates under the requirements of **ANSI/NCSL Z540-1** which also covers the requirements for **MIL STD 45662A**, **ISO 17025**, and ISO 9001:2015 NQA certification no.: **11252**.

*Traceability to NIST by NIST calibration of Transfer Standard Microphone is used to verify consistency between DANAK/DPLA and NIST calibrations.

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