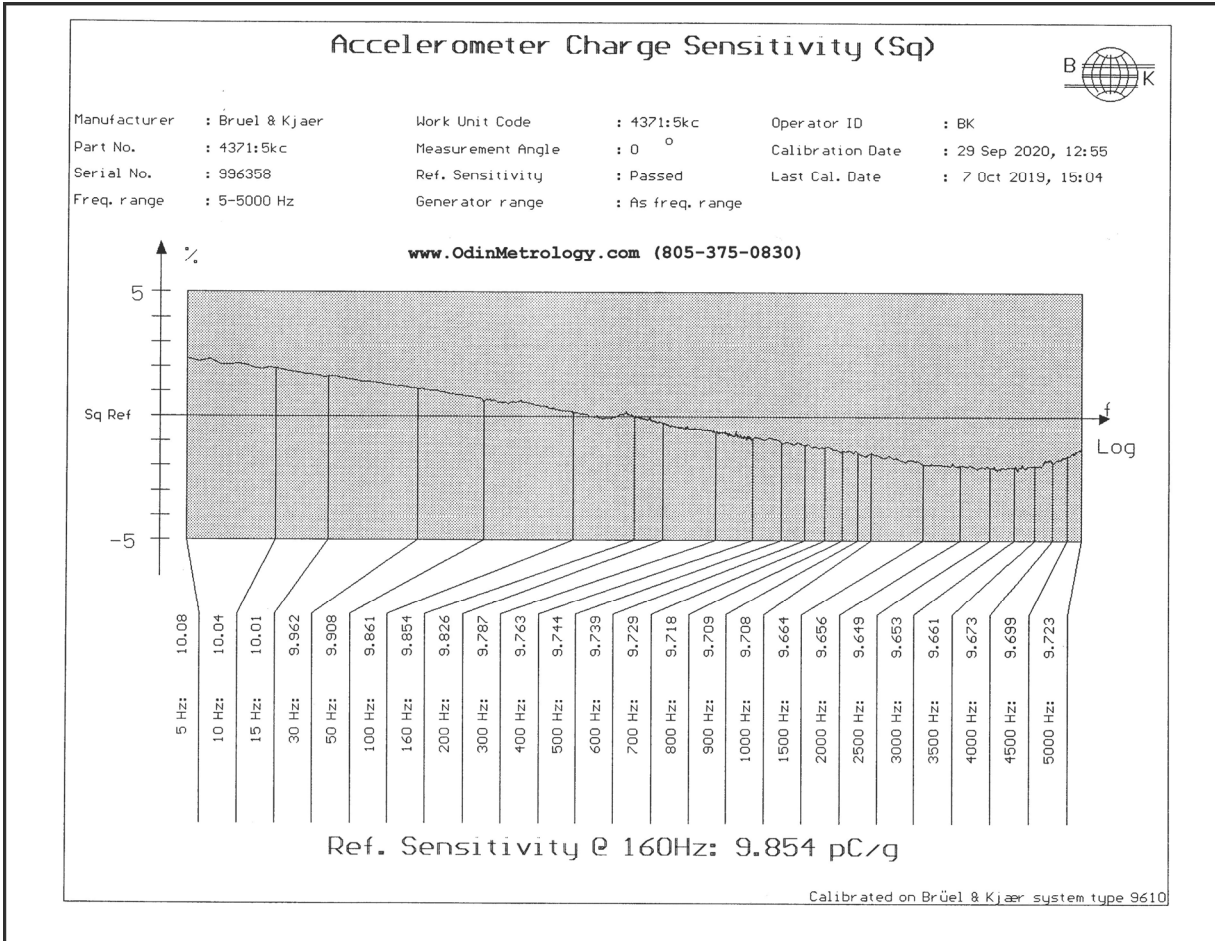


Certificate of Calibration for Brüel & Kjær Accelerometer

Type **4371**
Serial no. **996358**
Asset no. **N/A**
Submitted by **Odin Metrology, Inc.**
PO no. **N/A**

PERFORMANCE FOUND			
Sens. At 160 Hz	Unit	Sensitivity	Frequency Response*
9.854	pC/g	Within	Within
1.005	pC/m/s ²		

*Manufacturer's specifications indicated by shaded area of graph
Note: this device is not adjustable: data is "as found" and "as left."



This calibration is performed on Brüel & Kjær transducer calibration system type 9610 with calibration software WT 9301 version 1.12.04, June 25, 2001. This calibration system operates in conformance to ANSI/NC SL Z540-1 (1994), ISO 17025, and ISO 9001:2015. NQA certification number: 11252. Calibrated with Odin Metrology procedure OM-P-1003-Accelerometer-9610, last revised June 17, 2013.

REFERENCE STANDARDS			
Type no.	Serial no.	Cal. By	Cal. Due
8305/WH2335	1412753	B&K	24 JUN 2022

Expanded uncertainty of measurement ($k = 2$): 0.5%
NIST traceable number: **455764/455763**.

BEST UNCERTAINTY OF MEASUREMENT	
With 95% confidence level at 160 Hz	1.30%

CONDITION OF TEST		
Ambient Pressure	988.95	hPa
Temperature	23	°C
Relative Humidity	38	%
Date of Calibration	29 SEP 2020	
Re-calibration due on	29 SEP 2021	

Calibration performed by

Harold Lynch

Harold Lynch, Service Manager

Odin Metrology, Inc.

Note: calibration on Brüel & Kjær accelerometer calibration system type 9610 is performed by random excitation and measured in frequency ranges from 5-5,000 Hz and from 10 to 10,000 Hz. The calibration method is that of the improved back-to-back calibration by substitution utilizing a two-channel FFT analyzer. The system obtains calibration results that not only provide the low uncertainty of approximately 1% but also provide consistent repeatability of the calibrations. Extremely good correlation is proven between calibrations performed on different type 9610 calibration systems and also to national calibration laboratories. The consistency and accuracy of 9610 calibrations are provided by the continuous control of the process ensuring coherence between the measuring channels and providing verifications between working accelerometer and reference accelerometer.

Instrumentation used for calibration of accelerometers

Reference Item	Mfg.	Type No.	Serial No.	Cal. Date	Due Date	Cal. By
Reference Accelerometer	B&K	8305	1412753	24 JUN 2020	24 JUN 2022	B&K
Reference Accelerometer	B&K	8305	1435168	24 JUN 2020	24 JUN 2022	B&K
Measuring Amplifier	B&K	2525	2089234	24 JUN 2020	24 JUN 2022	B&K
Precision Barometer	DRUCK	141	299/95-10	04 DEC 2019	04 DEC 2020	CMI

Uncertainty of type 9610 calibrations

The following tabulations for uncertainty of accelerometer calibrations performed on type 9610 are from Brüel & Kjær's instruction manual for type 9610 and are all based on a confidence level of 95%.

For charge calibration performed on 9610 shaker type 4808 (range: 5-5,000 Hz):

100 & 160 Hz	5 Hz-10 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-5 kHz
1.30%	1.40%	1.30%	1.30%	1.80%	2.20%

For charge calibration performed on 9610 shaker type 4809 (range: 10-10,000 Hz):

100 & 160 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-7 kHz	7-10 kHz
1.30%	1.40%	1.30%	1.30%	2.20%	2.50%

For voltage calibration performed on 9610 shaker type 4808 (range: 5-5,000 Hz):

100 & 160 Hz	5 Hz-10 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-5 kHz
1.30%	2.00%	1.60%	1.40%	1.80%	2.20%

For voltage calibration performed on 9610 shaker type 4809 (range: 10-10,000 Hz):

100 & 160 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-7 kHz	7-10 kHz
1.30%	2.00%	1.60%	1.40%	2.20%	2.50%

For velocity pickup calibration performed on 9610 shaker type 4808 (range: 5-2,000 Hz):

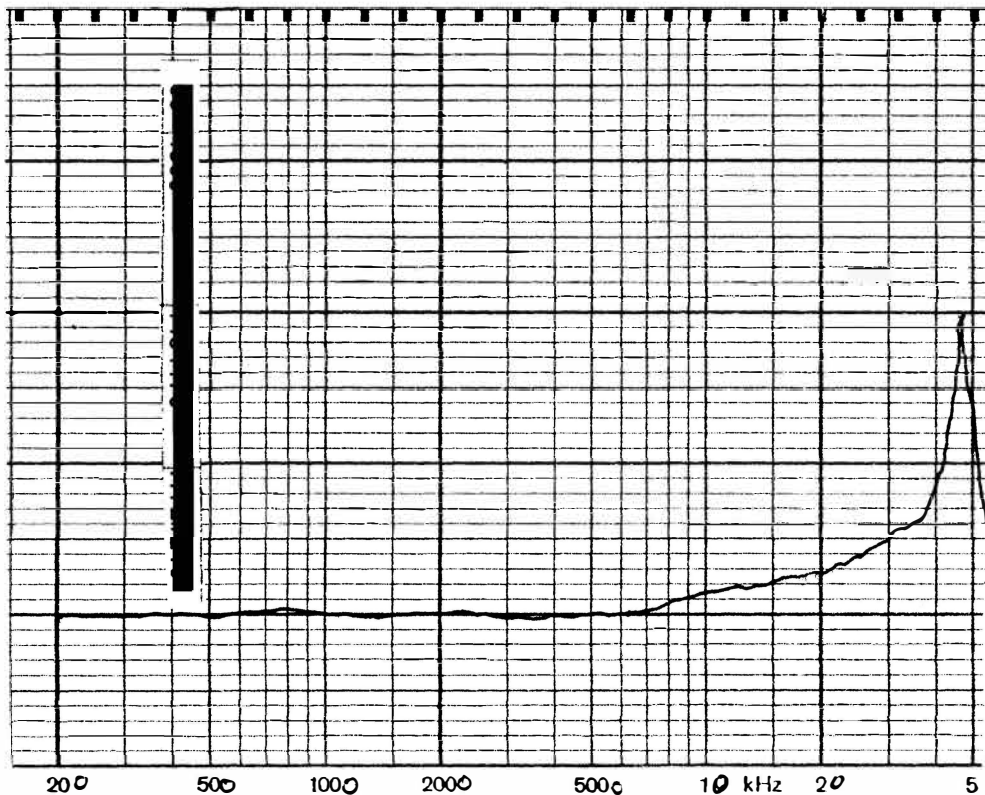
100 & 160 Hz
2.73%

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Odin Metrology, Inc.

Calibration of Sound & Vibration Instrumentation
3533 Old Conejo Road, Suite 125
Thousand Oaks, CA 91320
Phone 805-375-0830 Fax 805-375-0405
www.OdinMetrology.com

Mounted Resonance Response for Accelerometer Type 4371# 996358



The dynamic range indicated on the paper is 50 dB. The frequency response is obtained with the accelerometer mounted on a 180 gram stainless steel block using a calibration exciter type 4290. Accuracy: 200 Hz to 30% of the accelerometer's resonance frequency: ± 1 dB.