

# Excalibur Engineering

9201 Irvine Blvd  
Irvine, CA 92618  
Phone : (949) 454-6603  
Fax : (949) 454-6642

## Certificate Of Calibration

Customer SILENCER RESEARCH  
Report # 48714-1  
Date Received FRIDAY, APRIL 17, 2009  
Manufacturer BRUEL & KJAER  
Model # 4136  
Description MICROPHONE

Dept. N/A  
Bar Code #  
P.O. # CREDIT CARD  
Serial # 176004  
Asset # 21592

### Calibration Information

Date Calibrated 4/21/2009 Calibration Due Date 4/21/2010 Calibration Interval 12  
Maintenance Procedure 1371  
Temperature 21 ° C Humidity 28 % Calibration Performed By 7  
Accuracy ±0.12 dB

### Condition Received

Received In Tolerance  
Remarks Sensitivity -58.67dB re 1V/Pa  
See chart for frequency reponse.

### Condition Returned

Returned In Tolerance  
Remarks

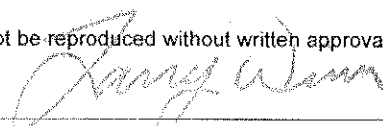
### Standards Employed

| ID # | Manufacturer  | Model # | Description               | Calibration Expires |
|------|---------------|---------|---------------------------|---------------------|
| 610  | BRUEL & KJAER | 4228    | PISTONPHONE               | 1/30/2010           |
| 043  | BRUEL & KJAER | 4190    | 1/2" CONDENSER MICROPHONE | 6/10/2009           |
| 051  | BRUEL & KJAER | 2639    | MICROPHONE PREAMPLIFIER   | 2/3/2010            |
| 713  | FLUKE         | 8920A   | 20 MHZ TRUE RMS VOLTMETER | 7/11/2009           |
| 941  | BRUEL & KJAER | 1049    | SINE & NOISE GENERATOR    | 12/5/2009           |
| 923  | BRUEL & KJAER | 2706    | POWER AMPLIFIER           | 7/11/2009           |
| 655  | BRUEL & KJAER | 4142    | MICRPHN CALIB APPARATUS   | 6/1/2010            |
| 654  | BRUEL & KJAER | 2307    | LEVEL RECORDER            | 7/15/2009           |
| 949  | BRUEL & KJAER | 2636    | MEASURING AMPLIFIER       | 2/3/2010            |

Excalibur Engineering, Inc. certifies that the instrument specified above meets the manufacturer's specifications and has been calibrated using Standards and Instruments also listed above whose accuracies are traceable to the National Institute of Standards and Technology(NIST), and the calibration systems and records are in compliance to ISO-10012 and ANSI Z540-1-1994.

This certificate/report shall not be reproduced without written approval of Excalibur Engineering, Inc.

Approved By



APR 23 2009

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## Certificate Of Calibration

Customer SILENCER RESEARCH  
Report # 48714-2  
Date Received FRIDAY, APRIL 17, 2009  
Manufacturer BRUEL & KJAER  
Model # 2209  
Description SOUND LEVEL METER

Dept. N/A  
Bar Code #  
P.O. # CREDIT CARD  
Serial # 670500  
Asset # 54653

### Calibration Information

Date Calibrated 4/21/2009 Calibration Due Date 4/21/2010 Calibration Interval 12  
Maintenance Procedure 4226  
Temperature 21 ° C Humidity 28 % Calibration Performed By 7  
Accuracy ANSI Type 1

### Condition Received

Received In Tolerance  
Remarks No batteries. Rattle inside case.

### Condition Returned

Returned In Tolerance  
Remarks Replaced batteries, nut and washer fell out when case opened. Reassembled unit, calibrated.

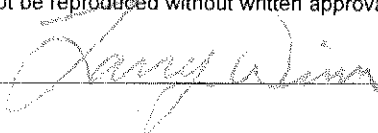
### Standards Employed

| ID # | Manufacturer  | Model # | Description               | Calibration Expires |
|------|---------------|---------|---------------------------|---------------------|
| 878  | BRUEL & KJAER | 4226    | SLM CALIBRATOR            | 1/28/2010           |
| 713  | FLUKE         | 8920A   | 20 MHZ TRUE RMS VOLTMETER | 7/11/2009           |
| 043  | BRUEL & KJAER | 4190    | 1/2" CONDENSER MICROPHONE | 6/10/2009           |

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## Certificate Of Calibration

Customer SILENCER RESEARCH.  
Report # 48714-3  
Date Received FRIDAY, APRIL 17, 2009  
Manufacturer BRUEL & KJAER  
Model # 4220  
Description PISTONPHONE

Dept. N/A  
Bar Code #  
P.O. # CREDIT CARD  
Serial # 757225  
Asset # 54524

### Calibration Information

Date Calibrated 4/21/2009 Calibration Due Date 4/21/2010 Calibration Interval 12  
Maintenance Procedure 1256  
Temperature 21 ° C Humidity 28 % Calibration Performed By 7  
Accuracy ±0.15 dB

### Condition Received

Received In Tolerance  
Remarks See attached data report

### Condition Returned

Returned In Tolerance  
Remarks

### Standards Employed

| ID # | Manufacturer  | Model # | Description               | Calibration Expires |
|------|---------------|---------|---------------------------|---------------------|
| 089  | BRUEL & KJAER | 4228    | PISTONPHONE               | 1/30/2010           |
| 043  | BRUEL & KJAER | 4190    | 1/2" CONDENSER MICROPHONE | 6/10/2009           |
| 051  | BRUEL & KJAER | 2639    | MICROPHONE PREAMPLIFIER   | 2/3/2010            |
| 949  | BRUEL & KJAER | 2636    | MEASURING AMPLIFIER       | 2/3/2010            |
| 305  | AGILENT       | 8903B   | AUDIO ANALYZER            | 5/30/2009           |
| 713  | FLUKE         | 8920A   | 20 MHZ TRUE RMS VOLTMETER | 7/11/2009           |

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## Type I Acoustic Calibrator Data Sheet

Applicable Specifications: ANSI Z540 – 1  
 10CFR50App B  
 IEC 942 Type 1L  
 ANSI S1 . 40-1984 Type 1L  
 ISO 9002 – 1994

Customer : Silencer Research Report : 48714-3  
 Date : 4-21-09 Ambient Pressure : 1002 mb  
 Model : 4220 Temp : 21  
 Ser. No. : 757225 R.H. % : 28  
 Corrected S.P.L. For : -0.1dB

| Range          | As Found | As Left | Tolerance           |
|----------------|----------|---------|---------------------|
| S.P.L.         | 124.33   | Same    | ± .15dB of Original |
| Frequency      | 247.2    | Same    | ± 1.5% of 251.2 Hz  |
| T.H.D          | 2.25     | Same    | < 3%                |
| High Frequency | 38       | Same    | > 35 dB Down        |

Calibration performed as follows: A 4144 Bruel & Kjaer microphone was inserted into two laboratory standard pistonephones using a Bruel & Kjaer 2636 as an amplifier and reading with a Hewlett Packard 8903B and a Fluke 8920A. Corrections were calculated for reference conditions and the readings were found to be within .03dB of their nominal value. The unit under test and a third check standard were then inserted into the measurement setup, readings then taken and corrections for reference conditions generated. The check standard was calculated to be within .03dB of its' calibrated value.

The uncertainty of this measurement method is estimated to be .09dB. Including systematic and random uncertainties. Using R55 methodology where indicated at a 95% confidence factor. This methodology is in accordance with NCSL recommended practices for transfer measurement.

Meterologist \_\_\_\_\_