

Hawks View, Castleton Sidings, Rochdale

Acoustic Barrier Verification Measurements

Prepared by:	Liam Harrison (AMIOA)
Checked by:	Paul Knowles (MIOA)

1.0 Introduction

- 1.1 Acoustic and Engineering Consultants Ltd (AEC) has been appointed by Kellen Homes to undertake verification noise measurements in relation to the acoustic barrier installed along the southern boundary of the site, with regards to the discharge of planning condition requirements as follows;

The development hereby approved shall be implemented in accordance with the submitted noise impact assessment to achieve the following internal and external noise levels

- 35 dB(A) Leq (16 hour) in the bedrooms with windows shut and other means of ventilation provided between 7 am and 11pm;
- 30dB(A) Leq 8 hour in the bedrooms with windows shut and other means of ventilation provided between 11pm and 7am;
- 35 dB(A) Leq (16 hour) in the living room/s with windows shut and other means of ventilation provided between 7 am and 11pm;
- 40dB(A) Leq (16 hour) in other habitable rooms with windows shut and other means of ventilation provided at all times;
- Noise in external amenity areas shall not exceed 57 dB(A).

The acoustic fence is installed along the southern boundary as documented in section 5.1. A verification report shall be submitted to and approved in writing by the Local Planning Authority prior to first occupation of any dwelling requiring acoustic mitigation measures.

2.0 Noise Measurements and Assessment

- 2.1 External verification measurements were undertaken at garden and first floor level of Plot 187 between 1145 and 1230h on Wednesday 29 October 2025 from. All measurements were undertaken in general accordance with BS7445-1: 2003 'Description and measurement of environmental noise. Guide to quantities and procedures'.
- 2.2 Noise levels at Location A were undertaken under free-field conditions, at 1.5m height, in the centre of the rear garden area. Noise levels at Location B were undertaken 1 meter from the first floor façade of neighbouring plot 188 under façade conditions. Therefore a correction of -3dB has been applied in order to convert them to free-field noise levels, as per guidance in BS7445-2: 1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use'.

- 2.3 A summary of the measured ambient and maximum noise levels measured at Locations A and B are presented in Table 2.1, below.

Table 2.1 – Summary of Measured External Noise Levels

Time, h	Noise Levels, dB	
	Location A (Garden)	Location B (First Floor Façade)
	Ambient, $L_{Aeq,15mins}$	Ambient, $L_{Aeq,15mins}$
1145 – 1200	56	57
1200 – 1215	55	57
1215 – 1230	55	56

- 2.4 The noise levels presented in Table 2.1 demonstrate that noise levels in the external amenity areas would be below $57dB_{LAeq,16h}$, and therefore, comply with the planning condition.
- 2.5 Simultaneous internal measurements were taken internally within Plot 187. These measurements were undertaken in general accordance with the Association of Noise Consultants guidance “*Measurement of Sound Levels in Buildings*” issued in June 2020.
- 2.6 As the development is ventilated via acoustic trickle ventilators, the internal measurements were undertaken with these open but with windows closed.
- 2.7 The measured daytime internal ambient noise levels are shown in Table 2.2, along with the criteria for comparison purposes. Ten minute sample measurements were undertaken within each room in accordance with the ANC document referenced above.

Table 2.2– Measured Daytime Internal Ambient Noise Levels and Criteria

Plot No.	Floor/ Elevation	Noise Level, $dB_{LAeq, T}$ Daytime (0700 – 2300h)			
		Time	Measured Level	Criteria	Performance Standard Met
Plot 187	Living Room	1155–1200	27	≤ 35	✓
	First-floor Rear Bedroom (railway facing façade)	1201-1206	31	≤ 35	✓
	First-floor Front Bedroom	1210-1115	29	≤ 35	✓

- 2.8 The internal daytime ambient noise levels presented in Table 2.1 demonstrate that the required criteria to comply with the planning conditions has been met in all rooms tested.
- 2.9 Based on the measured levels and the expectation that external noise levels would be lower during the night time period (2300-0700), the internal ambient night time criteria of $30dB_{LAeq,8h}$ would be readily achieved
- 2.10 The maximum noise level due to train movements did not exceed $45dB_{LAmax,F}$ in any of the rooms tested during the daytime.

- 2.11 It is expected that maximum noise levels, and the frequency of rail activity will be lower at night, therefore, the maximum noise level requirement of not exceeding $45\text{dB}_{L_{A_{\text{max}},F}}$ more than 15 times per night would be easily achieved in the bedrooms of the properties.
- 2.12 Based on the above, the installed acoustic fence installed along the southern barrier is fit for purpose, and the internal and external noise levels meet the local authority requirements outlined in Section 1.0.

Appendix A – Calibration Certificates

Certificate of Calibration Issued by University of Salford (Acoustics Calibration Laboratory)		
Page 1 of 3		
APPROVED SIGNATORIES Claire Lomax [] Sean Furlong [] Harry Bulger [x] Daniel Wong-McSweeney []		
acoustic calibration laboratory The University of Salford, Salford, Greater Manchester, M5 4WT, UK http://www.acoustics.salford.ac.uk t 0161 295 3030/0161 295 3319 f 0161 295 4456 e c.lomax1@salford.ac.uk		

Certificate Number: 06527/2

Date of Issue: 15 November 2023

PERIODIC TEST OF A SOUND LEVEL METER to IEC 61672-3:2006

FOR:	Acoustic & Engineering Consultants Ltd Suite 316, 3rd Floor Broadstone Mill Broadstone Road Stockport SK5 7DL
FOR THE ATTENTION OF:	Naveen Ramesh Simha
DATE RECEIVED:	13 November 2023
PERIODIC TEST DATE:	15 November 2023
LOCATION OF CALIBRATION:	Acoustic Calibration Laboratory, Newton G31, University of Salford
TEST PROCEDURE:	CTP12 (Laboratory Manual)

Sound Level Meter Details-

Manufacturer	B&K
Model	2250
Serial number	2456390
Class	I
Hardware version: 4.0	Sound Level Meter Software BZ7222 Version 4.7.6

Associated Items:-

Type	Manufacturer	Model	Serial Number	Adaptor
Microphone	B&K	4189	2876807	
Preamplifier	B&K	ZC 0032	25899	
Calibrator	B&K	4231	3018624	UC 0210

Test Engineer (initial): GP / RS Name: Gary Phillips / Rory Stocks

Results in this certificate relate only to instruments tested.

This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)

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Certificate Number: 06527/2

Date of Issue: 15 November 2023

Procedures from IEC 61672-3: 2006 and TPS 49 Edition 2 June 2009 were used to perform the periodic tests. Manufacturer's instruction manual was marked as follows: B&K 2250 BE 1712-15 April 2007 from hardware version 1.1. Adjustment data used to adjust the sound levels indicated in response to the application of a multi-frequency sound calibrator to sound levels equivalent to those that would be indicated in response to plane, progressive sound waves were obtained from the manufacturer's instruction manual referred to in this certificate.

The sound level meter calibration check frequency is 1000 Hz, the reference sound pressure level is 94 dB, and as this instrument only has a single range, this range is the reference level range.

The environmental conditions in the laboratory at the start of the test were:

Static pressure 100.949 kPa $\pm$ 0.014 kPa; air temperature 23.6 °C $\pm$ 0.3 °C; relative humidity 47.1 % $\pm$ 2.7 %.

The initial response of the instrument to application of the associated sound calibrator was 93.9 dB (C). The instrument was then adjusted to indicate 94.0 dB (C). This indication was obtained from the calibration certificate of the calibrator, 06527/1 and information in the manufacturer's instruction manual specified in this certificate, when the instrument is configured as follows: Input: Top socket, Transducer: 4189(2876807), Sound Field Correction: Free-field, Windscreen Auto Detect: Off, Windscreen Correction: None. The instrument was calibrated without a windshield. Consult manufacturer's instructions if using a windshield.

With the microphone installed the level of self-generated noise was:

A: 17.2 dB*

* Under-range indicated on instrument display

With the microphone replaced by the electrical input device specified in the manufacturer's instruction manual, the levels of self-generated noise were:

A: 13.1 dB*

B: 12.0 dB*

C: 13.3 dB*

Z_{Normal}: 18.3 dB*

Z_{Extended}: 22.7 dB*

* Under-range indicated on instrument display

The environmental conditions in the laboratory at the end of the test were:

Static pressure 101.010 kPa $\pm$ 0.014 kPa; air temperature 23.9 °C $\pm$ 0.3 °C; relative humidity 50.0 % $\pm$ 2.7 %.

This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)

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Certificate Number: 06527/2

Date of Issue: 15 November 2023

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Instruments used in the verification procedure were traceable to *National Standards*. The multi-frequency calibrator method was employed in the acoustical tests of a frequency weighting.

All measurement results are retained at the acoustic calibration laboratory for at least four years.

-----END OF CERTIFICATE-----

This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration Issued by University of Salford (Acoustic Calibration Laboratory)		
Page 1 of 2		
APPROVED SIGNATORIES Claire Lomax [] Sean Furlong [] Harry Bulger [x] Daniel Wong-McSweeney []		
acoustic calibration laboratory The University of Salford, Salford, Greater Manchester, M5 4WT, UK http://www.acoustics.salford.ac.uk t 0161 295 3030/0161 295 3319 f 0161 295 4456 e c.lomax1@salford.ac.uk		



Certificate Number: 06527/1 Date of Issue: 15 November 2023

CALIBRATION OF A SOUND CALIBRATOR

FOR: Acoustic & Engineering Consultants Ltd
 Suite 316, 3rd Floor
 Broadstone Mill
 Broadstone Road
 Stockport
 Cheshire
 SK5 7DL

FOR THE ATTENTION OF: Naveen Ramesh Simha

DESCRIPTION: Calibrator with housing for one-inch microphones and adaptor type UC 0210 for half-inch microphones.

MANUFACTURER: B&K

TYPE: 4231

SERIAL NUMBER: 3018624

DATE RECEIVED: 13 November 2023

DATE OF CALIBRATION: 15 November 2023

LOCATION OF CALIBRATION: Acoustic Calibration Laboratory,
 Newton G31, University of Salford.

TEST PROCEDURE: CTP06 (Laboratory Manual)

Test Engineer (initial): GP Name: Gary Phillips

Results in this certificate relate only to instruments tested.

This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Issued by University of Salford (Acoustic Calibration Laboratory)

Page 2 of 2

Certificate Number: 06527/1

Date of Issue: 15 November 2023

MEASUREMENTS

The sound pressure level generated by the calibrator was measured using a calibrated, WS2P condenser microphone as specified in this certificate. The calibration was carried out with the calibrator in the half-inch configuration.

Five determinations of the sound pressure level, frequency and total distortion were made.

The results have been corrected to the reference pressure of 101.325 kPa using manufacturer's data.

RESULTS

Coupler configuration: Half-inch

Microphone type: B&K 4192

Output level (dB re 20 μ Pa): 94.08 dB $\pm$ 0.11 dB

Frequency (Hz): 999.97 Hz $\pm$ 0.12 Hz

Total Distortion (%): 0.02 % $\pm$ 0.25 %

*Negative values of distortion are not realistic and are not included in the confidence interval.

Average environmental conditions at the time of measurement were:

Pressure: 100.660 kPa $\pm$ 0.014 kPa

Temperature: 22.4 °C $\pm$ 0.4 °C

Relative humidity: 45.9 % $\pm$ 2.7 %

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

All measurement results are retained at the acoustic calibration laboratory for at least four years.

-----END OF CERTIFICATE-----

This certificate provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 18 January 2024

CERTIFICATE NUMBER 206751



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

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Approved signatory

M. Berry

Electronically signed:

M. BERRY

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G078287	
Class:	1	
Firmware version:	3.2.3254	

Test summary

Date of calibration: 17 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 1 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:

206751

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Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 98.58 kPa Temperature: 21.7 °C Humidity: 36.6 %
After Pressure: 98.58 kPa Temperature: 21.7 °C Humidity: 38.6 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDQ6R6309
Attenuator	Cirrus Research	ZE:952	93892
Environmental Monitor	Comet	T7510	16966334

Additional instrument information

Instruction manual:

Reference level range: Single range

Pattern approval: No

Source of pattern approval: -

Preamplifier

Model: MV:200F

Serial number: 5719F

Microphone

Model: MK:224

Serial number: 206255A

Test results summary

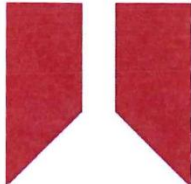
Test	Result
Toneburst response	Complies
Electrical noise-floor	Complies
Linearity	Complies
Electrical Frequency weightings	Complies
Frequency and time weightings at 1 kHz	Complies
C-weighted peak	Complies
Overload indication	Complies
High level stability	Complies
Long-term stability	Complies
Acoustic Frequency weightings	Complies

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **18 January 2024**

CERTIFICATE NUMBER **206780**



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

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Approved signatory

M.Berry

Electronically signed:

M.BERRY

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Brüel & Kjær

Notes:

Model: 4230

Serial number: 1441331

Class: 1

Test summary

Date of calibration: 18 January 2024

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC60942_2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The sound calibrator has been shown to conform to the Class 1 requirements for periodic testing, described in Annex B of IEC 60942:2003 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

However, as public evidence was not available, from a testing organisation responsible for pattern approval, to demonstrate that the model of sound calibrator conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, no general statement or conclusion can be made about conformance of the sound calibrator to the requirements of IEC 60942:2003.

Notes:

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:

206780

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Environmental conditions

The following conditions were recorded at the time of the test:

Pressure: 99.81 kPa
Temperature: 25.4 °C
Humidity: 39.3 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Distortion Meter	Keithley	2015	0994818
Acoustic Calibrator	Brüel and Kjær	4231	2610257
Environmental Monitor	Comet	T7510	21962628

Initial Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	94.00	94.04	94.03	94.03	94.03	0.03	±0.40	0.11 dB
Distortion (%)	< 3.00	0.87	0.83	1.03	0.91	0.91	+3.00	0.13 %
Frequency (Hz)	1000.0	1020.4	1020.2	1021.0	1020.5	20.5	±10.0	0.1 Hz

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

Adjusted Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	94.00	94.05	94.04	94.05	94.05	0.05	±0.40	0.11 dB
Distortion (%)	< 3.00	0.90	0.93	0.93	0.92	0.92	+3.00	0.13 %
Frequency (Hz)	1000.0	1004.4	1005.0	1004.4	1004.6	4.6	±10.0	0.1 Hz

End of results