



Ref: P4183/L08a/PJK

01 November 2022

Mr N Mussarat
Property Hub
Universal Square
Suite 2
Ground Floor, Building 3
Devonshire Street North
Manchester
M12 6JH

Dear Nabeel,

Commercial Unit, Wilmslow Road, Fallowfield – Planning Conditions 5 and 6

Introduction

Acoustic & Engineering Consultants Limited (AEC) attended site between 1200 and 1245h on Friday 15 July 2022 to undertake simultaneous noise measurements in the ground floor German Donor Kebab (GDK) restaurant and first-floor apartment at 311-313 Wilmslow Road, Fallowfield.

These measurements, along with extended internal noise level measurements undertaken in April 2021 (letter ref: P4183/L06a/RDC), were required to discharge Planning Conditions 5 and 6 that were placed on the scheme by Manchester City Council (MCC).

However, in response to these measurements, a letter was issued by Julie Roscoe, Director of Planning, Building Control and Licensing at Manchester City Council, which stated that further information is required to discharge these conditions. The requested information is presented below:

“Condition 5 (Acoustic Insulation)

The noise report submitted has assumed that the entertainment noise part of the noise condition does not apply. It is indicated that the restaurant will not be playing loud amplified music, but will be playing 'background music'. However, information is required to demonstrate how this music will be controlled (to meet the MCC noise criteria in the adjoining flats).

Condition 6 (Acoustic Insulation residential)

This report has calculated the predicted noise levels in the flats when the venue is operating. The Council requires details of post completion testing in the flats to verify that the MCC internal noise criteria are met. This report should provide information on the octave band data and the LAeq levels in the adjoining flats when the restaurant is operating.”

The acoustic terminology used throughout this report is described in brief in Appendix A at the back of the report.

A noise measurement procedure is presented in Appendix B, along with calibration certificates,

Planning Condition 5

During the site visit on Friday 15 July 2022, a measurement was undertaken with no patrons in the GDK restaurant. During this measurement the ambient noise level was $60\text{dBL}_{\text{Aeq},1\text{min}}$ and was dominated by the amplified background music.

After speaking to the manager of the GDK restaurant, this operating noise level is considered typical and the music system is set to not exceed this figure. Warning lights on the system form a backup system should this figure ever be exceeded. Furthermore, it is understood that the music system is located within a locked cupboard which is only accessible by the manager.

Based on AEC's experience, this figure of $60\text{dBL}_{\text{Aeq},1\text{min}}$ would be classed as 'low-level background music'. With the music operating at this noise level, noise from activities within the GDK restaurant was not audible externally against the prevailing noise climate on Wilmslow Road (road traffic).

Planning Condition 6

Criteria

MCC has outlined their requirements for noise assessments to accompany planning applications in 'Planning & Noise – Technical Guidance' (2015) (PNTG).

Section 3.7.1.1 of this document states *"The Council has adopted the following internal limits for residential properties:*

- *Bedroom (night-time – 23.00 – 07.00) $30\text{dBL}_{\text{Aeq}}$ (individual noise events should not normally exceed $45\text{dBL}_{\text{Amax,F}}$ by more than 10 times);*
- *Living Rooms (daytime – 07.00 – 23.00) $35\text{dBL}_{\text{Aeq}}$."*

These levels are based on guidance presented in BS8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS8233) and The Association of Noise Consultants (ANC) document Professional Practice Guidance (ProPG) on Planning and Noise 'New Residential Development' (2017).

In addition to the above, where a venue plays music and has new residential developments that are structurally connected, the following criteria is also set:

'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB ($\text{Leq},5\text{min}$), respectively'.

Assessment

In order to demonstrate compliance with the above criteria, MCC require that verification testing is carried out once the development is built, but prior to the first occupation of any of the residential units. However, due to the timing of when the restaurant was functioning, verification testing could only be undertaken when the residential units were occupied.

As a result of this, access to the residential units was difficult and verification testing could only be arranged to the Living Room of Flat 2 and this is discussed below. In relation to Flats 1 and 3, sound insulation measurements were carried out in 2020 and an appropriate calculation assessment has been carried out to ensure that the above criteria has been met. This is also discussed below.

In order to support the above assessment, noise levels were undertaken with the amplified music playing with the amplified music noise playing at 60dB $L_{Aeq,1min}$ and with the addition of patrons into the restaurant, the octave band centre frequencies of the ambient and highest maximum noise level measured in the GDK restaurant during the survey are presented in Table 1, below.

Table 1 – Measured Ambient and Maximum Noise Level in the Restaurant

Noise Level	Noise Level, dB	Noise Level, dB @ Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
Ambient, $L_{Aeq,15min}$	73	60	64	69	73	67	62	54
Maximum, $L_{Amax,F}$	85	70	75	81	84	81	72	67

It should be noted that the ambient and maximum noise levels presented in Table 1 are in line with the anticipated noise levels used by AEC in the assessment of noise breaking out of the restaurant.

Flat 2 Assessment

In order to determine the noise breakout from the levels presented in Table 1, above, into Flat 2, which is located directly above the GDK restaurant, simultaneous measurements were undertaken.

Whilst in Flat 2, it was observed by the AEC engineer that the noise climate in the flat was dominated by road traffic and noise from the GDK was inaudible. The simultaneous ambient and maximum noise levels measured in Flat 2 during the same period as Table 1 are presented in Table 2, below.

It should be noted that during the measurements, there was heavy rain outside and as the dominating noise climate within the flat was due to external road traffic, the noise levels presented in Table 2 have been corrected by -3dB. This is in line with a study undertaken by Bialystok University of Technology titled '*Comparison of vehicle noise on dry and wet road surfaces*' (published in January 2007) concluded that there was an increase of around 3dB in noise levels when cars and larger vehicles drove passed.

Table 2 – Corrected Measured Ambient and Maximum Noise Level in Flat 2, Living Room

Noise Level	Noise Level, dB	Noise Level, dB @ Octave Band Centre Frequencies, Hz						
		63	125	250	500	1k	2k	4k
Ambient, $L_{Aeq,15min}$	34	39	36	33	27	31	26	18
Maximum, $L_{Amax,F}$	46	46	47	42	33	35	29	26

As per Table 2, MCC's criteria of not exceeding 47dB and 41dB in the 63Hz and 125Hz octave band centre frequencies (L_{eq}) have been achieved.

In addition, MCC's criteria of not exceeding 35dB $L_{Aeq,16h}$, has also been achieved.

A noise level was measured in the bedroom of Flat 2, however, due to interference from a resident the data was corrupted. However, it should be noted that based on the on-site observations of the member of AEC staff, noise from the restaurant was inaudible at all times. In addition, based on the measured ambient noise level presented in Table 1 and the sound insulation performance of the separating floor between the restaurant and the bedroom, the ambient noise level from this source would be no greater than 18dB in the bedroom.

Therefore, as the requirement was achieved in the bedroom from external noise sources, the total ambient noise level in the bedroom would be no greater than 30dB_{LAeq,8h}. Thus complying with MCCs requirement.

Flat 1 and 3 Assessment

In order to determine if the MCC criteria has been achieved in Flat's 1 and 3, the results from the sound insulation testing previously carried out by AEC will be used. This was undertaken on the separating wall and floor between the restaurant and Flat 1 (on the ground floor) and Flat 3 (on the first floor).

The resultant ambient noise levels in the 63Hz and 125Hz octave band centre frequencies (L_{eq}) in each flat based on the internal ambient noise level (73dB_{LAeq,15min}) measured in the GDK restaurant (Table 1) and the previously measured airborne sound insulation performances are presented in Tables 3, 4 and 5 below.

Table 3 – Comparison of Ambient Noise Level in Apartment 1 Living Room with MCC's Requirement at 63 and 125Hz octave band centre frequencies (L_{eq})

Assessment Step	Noise Level, dB @ Octave Band Centre Frequency's, Hz	
	63	125
Ambient Noise Level, dB _{Leq}	60	64
Measured Sound Insulation of the separating wall D_w	35	37
Resultant Ambient Noise Level in the Apartment, dB _{Leq}	25	27
MCC Requirement	47	41
Difference	-22	-14

Table 4 – Comparison of Ambient Noise Level in Apartment 3 Bedroom with MCC's Requirement at 63 and 125Hz octave band centre frequencies (L_{eq})

Assessment Step	Noise Level, dB @ Octave Band Centre Frequency's, Hz	
	63	125
Ambient Noise Level, dB _{Leq}	60	64
Measured Sound Insulation of the separating floor D_w	38	43
Resultant Ambient Noise Level in the Apartment, dB _{Leq}	22	21
MCC Requirement	47	41
Difference	-25	-20

Table 5 – Comparison of Ambient Noise Level in Apartment 3 Living Room with MCC's Requirement at 63 and 125Hz octave band centre frequencies (L_{eq})

Assessment Step	Noise Level, dB @ Octave Band Centre Frequency's, Hz	
	63	125
Ambient Noise Level, dBL_{eq}	60	64
Measured Sound Insulation of the separating floor D_w	41	42
Resultant Ambient Noise Level in the Apartment, dBL_{eq}	19	22
MCC Requirement	47	41
Difference	-28	-19

Tables 3, 4 and 5 indicate that MCC's criteria would be achieved in all three apartments.

Based on the simultaneous noise levels measured in Flat 2 and the assessment of noise transfer into Flats 1 and 3, noise due to activities in the GDK restaurant comply with MCC's and AEC's suggested noise level limits.

Yours sincerely



Paul Knowles

Checked by: RDC

APPENDIX A – Acoustic Terminology in Brief

Sound Description

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discrete frequency - a 'pure tone' - most sound is made up of many different frequencies.

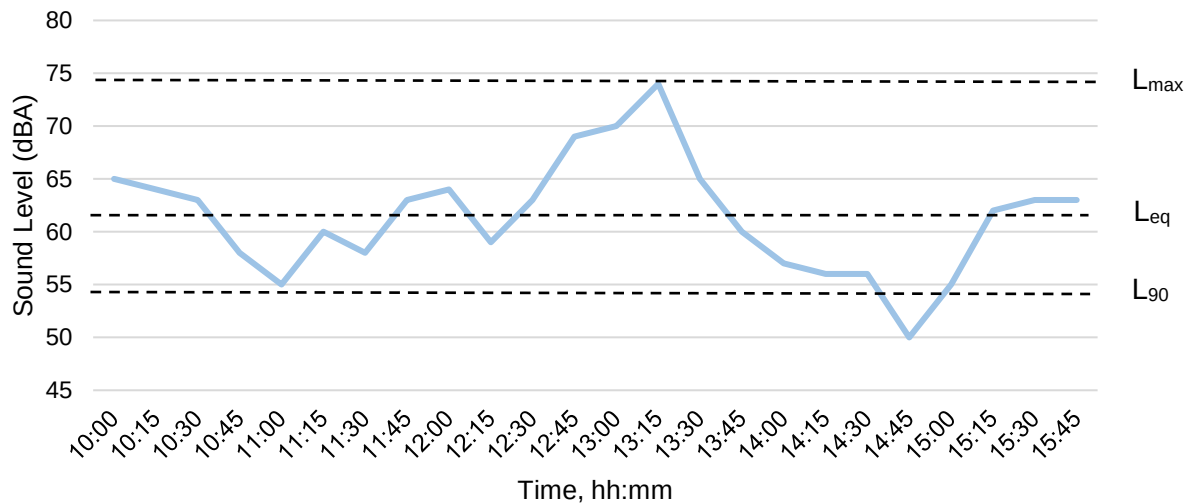
The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA*, normally used to assess the effect of noise on people. The *dBA* weighting emphasises or reduces the importance of certain frequencies within the audible range.

Sound Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the sound.

The figure below shows an example of sound level varying with time. Because of this time variation, the same period of sound can be described by several different levels. The most common of these are described below. It should be noted that in many instances in the main body of text, the unit will be preceded by a dB descriptor in the report e.g. $L_{Aeq,T}$ could be written $dB L_{Aeq,T}$.

Example of Sound Varying with Time



Unit Type	Acoustic Unit	Description
Ambient Sound Level	$L_{Aeq, T}$	The equivalent continuous (A-weighted) sound level. It may be thought of as the “average” sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the “ambient” noise level.
Background Sound Level	L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe background noise.
Maximum Sound level	L_{Amax}	The maximum (A-weighted) sound level measured during a given time. ‘Fast’ or ‘Slow’ meter response should be cited.
Free-field Level	-	This refers to the sound level measured outside, away from reflecting surfaces.
Façade Level	-	This refers to the sound level measured outside, at 1m from a hard-reflecting surface, typically 3dB greater than the free-field level.
Noise reduction coefficient	NRC	A single figure number sometimes used to describe the performance of sound absorbing materials based on a combination of its absorption coefficient at various frequencies.
Sound reduction index	R_w	Single number rating used to describe the <u>laboratory</u> airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
Weighted Level Difference	D_w	Single number rating used to describe the on-site airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.

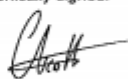
APPENDIX B – Noise Survey Details

Date & Time of Survey:	1200 to 1245h, Friday 15 July 2022.					
Personnel:	Paul Knowles and Ross Chamberlain (AEC).					
Equipment Used:	Cirrus CR:171B Real Time Analyser (AEC Kit 3). Cirrus CR:171B Real Time Analyser (AEC Kit 5).					
Calibration:	The sound level analysers, which conforms to BS EN 61672-1: 2013 ' <i>Electroacoustics – Sound level meters - Part 1 Specifications</i> ' for Class 1 Type Z meters, was in calibration and check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. Calibration certificates are presented below.					
Weather Conditions:	Unattended:					
	Date	Period	Wet/Dry	Temp°C	Wind Speed & Direction	Cloud Cover
	15.07.22	Day	Wet	17°C	Calm	100%
Measurement Locations:	Measurements were undertaken in the kitchen and seating area of the GDK restaurant and the Living Room of Apartment 2.					
Measurement Details:	Measurements were undertaken over various periods in terms of L_{eq} and L_{max} .					
Measured Data:	Full results for the attended measurements are given in Table B1. Full 1/3 rd octave/octave band centre frequency data was obtained for all measurements.					

TABLE B1 – Measured Daytime Noise Levels

Location	Period, h	Noise Level, dB		Comments
		L_{Aeq}	$L_{Amax, F}$	
GDK	1222 – 1237	73.3	85.2	Noise from patrons and kitchen equipment.
Apt 2	1222 – 1237	37.1	48.8	Noise breaking in from external sources, noise from ground floor unit inaudible.

AEC Kit 3 – Calibration Certificates

CERTIFICATE OF CALIBRATION		
ISSUED BY	Cirrus Research plc	
DATE OF ISSUE	27 January 2022	CERTIFICATE NUMBER 169146
Cirrus Research plc Acoustic House Bridlington Road Hunmanby North Yorkshire YO14 0PH United Kingdom		
Page 1 of 2		
Approved signatory C.Scott Electronically signed: 		
Sound Level Meter : IEC 61672-3:2013		
Instrument information		
Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G078287	
Class:	1	
Firmware version:	3.2.3197	
Test summary		
Date of calibration: 27 January 2022		
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:

169146

Page 2 of 2

Environmental conditions

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

Before Pressure: 101.62 kPa Temperature: 22.6 °C Humidity: 39.9 %

After Pressure: 101.70 kPa Temperature: 22.8 °C Humidity: 41 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TG4001	350654
Attenuator	Cirrus Research	ZE 952	93467
Environmental Monitor	Comet	T7510	16966334

Additional instrument information

Instruction manual:

Reference level range: Single range

Pattern approval: No

Source of pattern approval: -

Preamplifier

Model: MV200F

Serial number: 5719F

Microphone

Model: MK224

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 27/01/22 CERTIFICATE NUMBER 169145



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

Page 1 of 2

Test engineer:
D. Swallow
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc
Model: MK-224
Serial Number: 206255A

Calibration procedure

Date of calibration: 20 January 2022
Open circuit: 44.1 mV/Pa
Sensitivity at 1 kHz: -27.1 dB rel 1 V/Pa

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to a National Measurement Institute.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Environmental conditions

Pressure: 102.60 kPa
Temperature: 21.0 °C
Humidity: 25.0 %

CERTIFICATE OF CALIBRATION

Certificate Number:

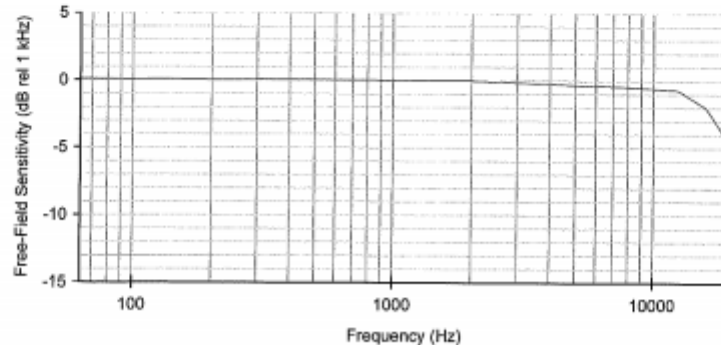
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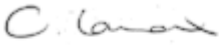
Page 2 of 2

Free-Field Frequency Response : Tabular

Frequency (Hz)	Free-Field Sensitivity (dB rel 1 kHz)	Actuator Response (dB)
63	0.09	-0.10
80	0.08	-0.01
100	0.04	0.04
125	0.07	0.08
160	0.05	0.09
200	0.04	0.08
250	0.03	0.09
315	0.06	0.09
400	0.04	0.09
500	0.04	0.07
630	0.03	0.06
800	0.02	0.03
1 000	0.00	0.00
1 250	-0.03	-0.06
1 600	-0.02	-0.14
2 000	-0.03	-0.24
2 500	-0.10	-0.44
3 150	-0.17	-0.73
4 000	-0.23	-1.15
5 000	-0.34	-1.72
6 300	-0.39	-2.51
8 000	-0.47	-3.67
10 000	-0.59	-5.27
12 500	-0.71	-7.16
16 000	-1.99	-9.81
20 000	-4.75	-13.78

Free-Field Frequency Response : Graphical



Certificate of Calibration Issued by University of Salford (Acoustic Calibration Laboratory)		
Page 1 of 2		
APPROVED SIGNATORIES Claire Lomax [x] Sean Furlong [] Gary Phillips [] Danny McCaul [] 		
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.lomax@salford.ac.uk		

Certificate Number: 05683/1

Date of Issue: 04 May 2022

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: Ross Chamberlain

DESCRIPTION: Calibrator with housing for one-inch microphones
 and adaptor type DB 0311 for half-inch
 microphones.

MANUFACTURER: B&K

TYPE: 4230

SERIAL NUMBER: 1441331

DATE RECEIVED: 18 March 2022

DATE OF CALIBRATION: 29 March 2022

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

TEST PROCEDURE: CTP06 (Laboratory Manual)

Test Engineer (initial):	GP	Name:	Gary Phillips
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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: 05683/1

Date of Issue: 04 May 2022

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 4180
Output level (dB re 20µPa): 93.88 dB $\pm$ 0.07 dB
Frequency (Hz): 1018.65 Hz $\pm$ 0.12 Hz
Total Distortion (%): 0.86 % $\pm$ 0.22 %

Average environmental conditions at the time of measurement were:

Pressure: 100.982 kPa $\pm$ 0.015 kPa
Temperature: 23.6 °C $\pm$ 0.4 °C
Relative humidity: 46.4 % $\pm$ 2.1 %

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.

Kit 5 – Calibration Certificates

Certificate of Calibration Issued by University of Salford (Acoustics Calibration Laboratory)	
Page 1 of 3	
APPROVED SIGNATORIES Claire Lomax [x] Andy Moorhouse [] <i>C. Lomax</i> Gary Phillips [] Danny McCaul []	
acoustic calibration laboratory The University of Salford, Salford, Greater Manchester, M5 4WT, UK http://www.acoustics.salford.ac.uk 0161 295 3030/0161 295 3319 f 0161 295 4456 e c.lomax1@salford.ac.uk	

Certificate Number: 05392/2

Date of Issue: 2 July 2021

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 Cheshire, SK5 7DL
FOR THE ATTENTION OF:	Ross Chamberlain
DATE RECEIVED:	22/07/2021
PERIODIC TEST DATE:	29 July 2021
LOCATION OF CALIBRATION:	Acoustic Calibration Laboratory, Newton G31, University of Salford
TEST PROCEDURE:	CTP12 (Laboratory Manual)

Sound Level Meter Details:-

Manufacturer	Cirrus
Model	CR171B
Serial number	G056597
Class	1
Firmware	V3.2.2690

Associated Items:-

Type	Manufacturer	Model	Serial Number
Microphone	Cirrus	MK224	207463B
Preamplifier	Cirrus	MK170	0108

Test Engineer (initial):	GP	Name:	Gary Phillips
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Results in this certificate relate only to instruments tested.

Certificate of Calibration Issued by University of Salford (Acoustics Calibration Laboratory)		
Page 2 of 3		
APPROVED SIGNATORIES Claire Lomax [x] Andy Moorhouse [] <i>C. Lomax</i> Gary Phillips [] Danny McCaul []		
acoustic calibration laboratory The University of Salford, Salford, Greater Manchester, M5 4WT, UK http://www.acoustics.salford.ac.uk 0161 295 3030/0161 295 3319 f 0161 295 4456 e c.lomax1@salford.ac.uk		

Certificate Number: 05392/2

Date of Issue: 2 July 2021

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: Optimus Sound Level Meters Part B Technical Information for Optimus sound level meters fitted with firmware version 2.3 or later and User manual for optimus sound level meters Issue 2.1 November 2012 optimus/11/12/21EN. Adjustment data used to adjust the sound levels indicated in response to the application of an electrostatic actuator to sound levels equivalent to those that would be indicated in response to plane, progressive sound waves were obtained from the manufacturer. The sound level meter calibration check frequency is 1000 Hz, the reference sound pressure level is 94 dB. 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 100.189 kPa $\pm$ 0.013 kPa; air temperature 23.1 °C $\pm$ 0.4 °C; relative humidity 55.8 % $\pm$ 2.1 %.

The initial response of the instrument to application of the suitable laboratory sound calibrator was 93.7 dB (A). No adjustment of the instrument was required. This indication was obtained from the calibration certificate of the calibrator and information in the manufacturer's instruction manual specified in this certificate when the instrument is configured with the supplied microphone extension cable and associated windscreen.

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

A: 17.4 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:

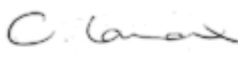
A: 14.6 dB*

C: 23.6 dB*

Z: 33.6 dB*

* Under-range indicated on instrument display.

The environmental conditions in the laboratory at the end of the test were: Static pressure 100.214 kPa $\pm$ 0.013 kPa; air temperature 23.3 °C $\pm$ 0.4 °C; relative humidity 55.9 % $\pm$ 2.1 %.

Certificate of Calibration Issued by University of Salford (Acoustics Calibration Laboratory)		University of Salford MANCHESTER
Page 3 of 3		
APPROVED SIGNATORIES Claire Lomax [x] Andy Moorhouse [] Gary Phillips [] Danny McCaul [] 		
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: 05392/2

Date of Issue: 2 July 2021

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.

No adjustment data have been published in the instruction manual or made available by the manufacturer or supplier of the sound level meter to account for the average effects of reflections from the influence of the supplied windscreen, as required by IEC 61672-3:2006. The average effects of reflections from the influence of the supplied windscreen have therefore been assumed to be numerically zero for the purposes of this periodic test. If these adjustment data are not actually zero, there is a possibility that the frequency response of the sound level meter may not meet the requirements of IEC 61672-1:2002 (BS EN 61672-1:2003).

Instruments used in the verification procedure were traceable to National Standards. The electrostatic actuator 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-----

Certificate of Calibration Issued by University of Salford (Acoustic Calibration Laboratory)	
Page 1 of 2	
APPROVED SIGNATORIES Claire Lomax [] Andy Moorhouse [] <i>J Phillips</i> Gary Phillips [x] Danny McCaul []	
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.lomax@salford.ac.uk	

Certificate Number: 05392/1

Date of Issue: 2 August 2021

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: Ross Chamberlain

DESCRIPTION: Sound calibrator with housing for half-inch microphones.

MANUFACTURER: Cirrus

TYPE: CR:515

SERIAL NUMBER: 56719

DATE RECEIVED: 22 July 2021

DATE OF CALIBRATION: 27 July 2021

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

TEST PROCEDURE: CTP06 (Laboratory Manual)

Test Engineer (initial):	CL	Name:	Claire Lomax
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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

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UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

Page 2 of 2

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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 reported results are valid at the environmental conditions at the time of calibration. Corrections to the stated level may be required depending on the actual environmental conditions at the time of use. Consult the manufacturer's instruction manual for further information.

RESULTS

Coupler configuration: Half-inch
Microphone type: B&K4192
Output level (dB re 20 μ Pa): 94.05 dB $\pm$ 0.09 dB
Frequency (Hz): 1000.30 Hz $\pm$ 0.12 Hz
Total Distortion (%): 1.23 % $\pm$ 0.22 %

Average environmental conditions at the time of measurement were:

Pressure: 100.150 kPa $\pm$ 0.015 kPa
Temperature: 22.2 °C $\pm$ 0.4 °C
Relative humidity: 52.6 % $\pm$ 2.1 %

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

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

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