



Ref: P3921/L61a/PJK

24 October 2024

First Street – Blocks A and B

Technical Note – Condition 16 – Internal Noise Levels

Prepared by:	Paul Knowles (MIOA)
Checked by:	Warren King (MIOA)

1.0 Introduction

1.1 Acoustic and Engineering Consultants Ltd (AEC) has been appointed by Downing Living to undertake noise measurements and prepare a technical note to review whether Condition 16 placed on the scheme by Manchester City Council (MCC), can be discharged.

1.2 Condition 16 of MCC's Planning Permission for the scheme states that:

"Prior to the commencement of the superstructure a scheme for acoustically insulating and mechanically ventilating the residential accommodation against noise from adjacent roads shall be submitted to and approved in writing by the City Council as local planning authority.

The approved noise insulation shall be completed before any of the dwelling units are occupied.

The following noise criteria will be required to be achieved:

Bedrooms (night time - 23.00 - 07.00) 30 dB LAeq (individual noise events shall not exceed 45 dB LAmax,F by more than 15 times)

Living Rooms (daytime - 07.00 - 23.00) 35 dB LAeq

Prior to occupation a post completion report to verify that all of the recommended mitigation measures have been installed and effectively mitigate any potential adverse noise impacts in the residential accommodation shall be submitted and agreed in writing by the City Council as local planning authority. Prior to occupation any non-compliance shall be suitably mitigated in accordance with an agreed scheme.

Reason - To secure a reduction in noise in order to protect future residents from noise nuisance, pursuant to policies SP1, H1 and DM1 of the Core Strategy."

1.3 As stated in AEC Report: P3921/R7/PJK, there was no entertainment noise sources affecting the habitable rooms in the development, therefore, this has not been considered further.

2.0 Noise Measurements and Assessment

General

- 2.1 The measurements were undertaken in general accordance with the Association of Noise Consultants guidance “*Measurement of Sound Levels in Buildings*” issued in June 2020. The calibration certificates for the measurement equipment used by AEC is presented in Appendix A.
- 2.2 As the development is ventilated via acoustic trickle ventilators, the measurements were undertaken with these open but with windows closed.

Block A

Measurement Details

- 2.3 Long term noise levels were measured by AEC between Wednesday 17th and Friday 19th July and Thursday 25th and Friday 26th July 2024 in Studio apartments and Cluster bedrooms on the fifth floor of Block A. Additional long term measurements were undertaken in a Studio apartments on the southern elevation on the 21st and 3rd floors between Monday 14th and Tuesday 15th October 2024.
- 2.4 Short term spot check measurements were also undertaken on the three other elevation during the daytime of Monday 14th October 2024. Please note that there external works being undertaken during these measurements which may contributed to measured level.
- 2.5 The indicative location of the measurements is presented in Figure B.1 of Appendix B and the location and orientation of Block A in relation to the sources of external noise is presented in Figure B.3.

Ambient Noise Levels

- 2.6 The daytime and night-time internal ambient noise levels measured during the surveys are presented in Tables 2.1 and 2.2, along with the criteria for comparison purposes.

Table 2.1 – Long Term Measured Internal Ambient Noise Levels and Criteria

Test Ref:	Floor / Room	Noise Level, dBL _{Aeq, T}			
		Daytime (0700 – 2300h)		Night-time (2300 – 0700h)	
		Measured Level	Criteria	Measured Level	Criteria
1	5 / Cluster 55/05	27 ¹	≤ 35	24	≤ 30
2	5 / Cluster 48/02	24 ¹	≤ 35	23	≤ 30
3	5 / Studio 52	32 ²	≤ 35	28	≤ 30
4	5 / Cluster 55/03	31 ²	≤ 35	30	≤ 30
5	21 / Studio 213	32 ¹	≤ 35	30	≤ 30
6	3 / Studio 13	31 ¹	≤ 35	30	≤ 30

¹1600-2300h

²1715-2300h

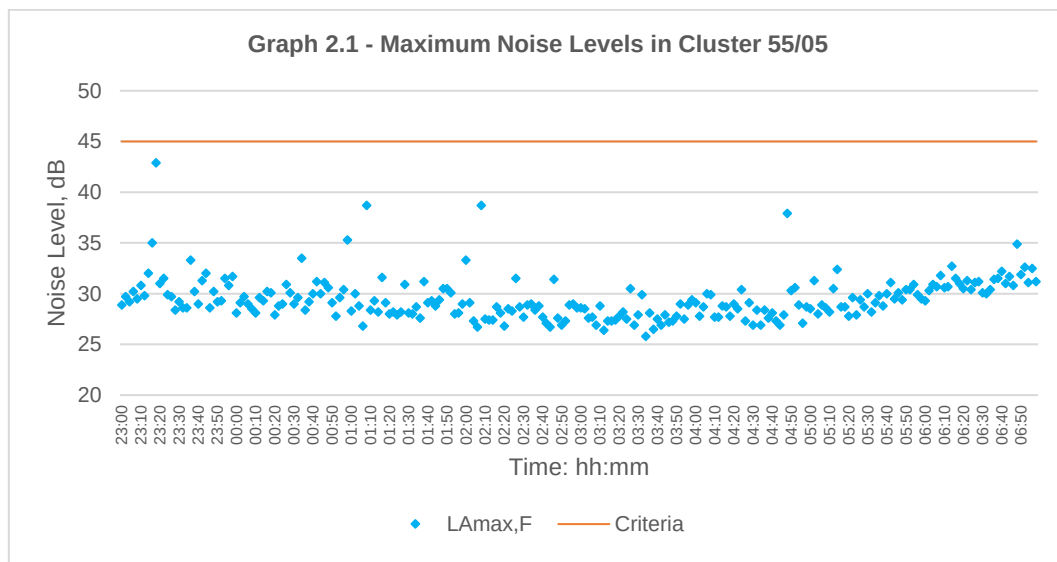
Table 2.2 – Short Term Measured Internal Ambient Noise Levels and Criteria

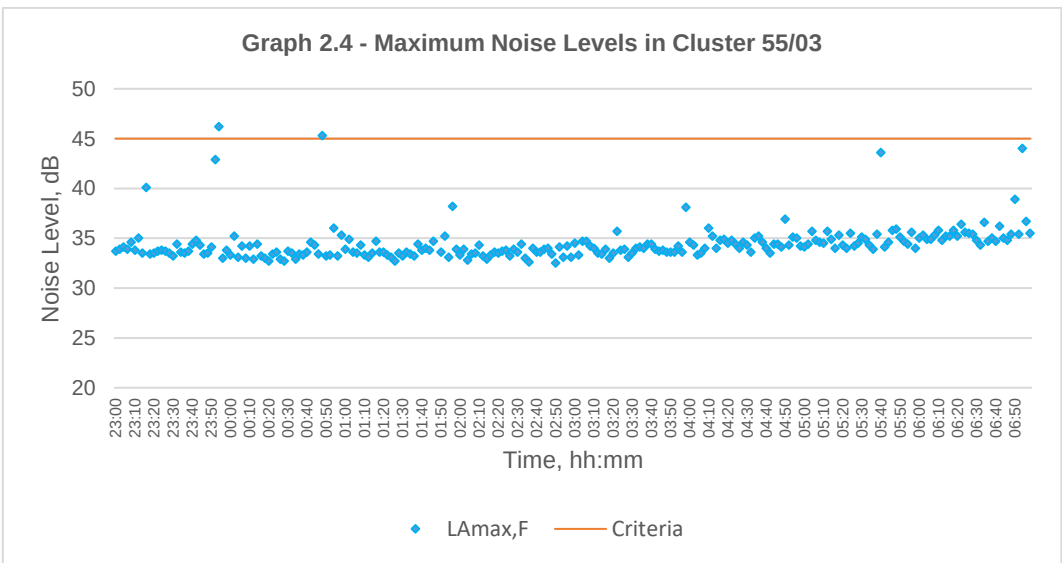
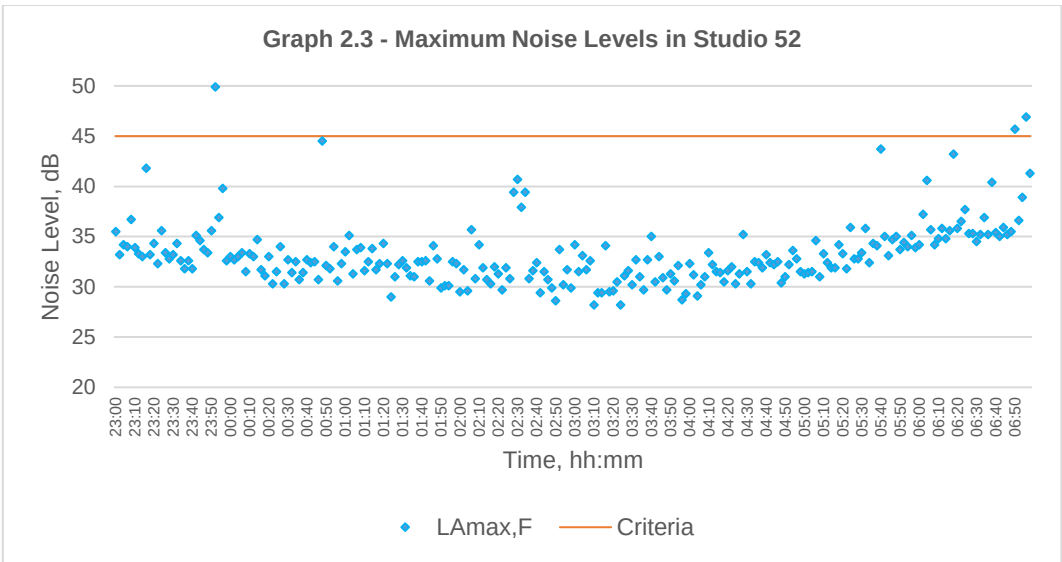
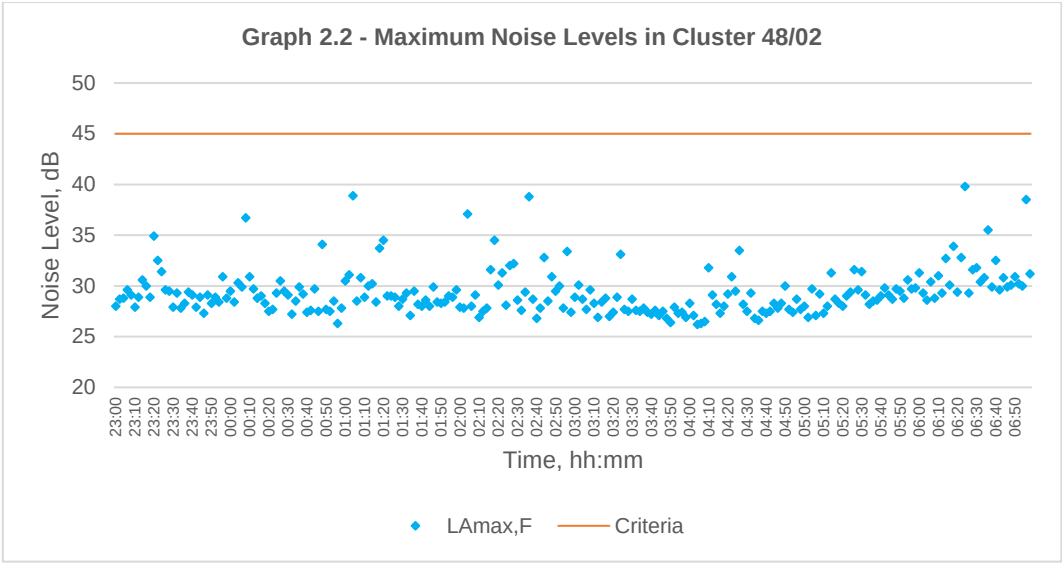
Test Ref:	Room	Noise Level, dBL _{Aeq, T}	
		Measured Level	Criteria
07	7 / Cluster 85/01	31	≤ 35
08	4 / Cluster 40/02	32	≤ 35
09	9 / Cluster 109/02	29	≤ 35
10	7 / Cluster 79/01	29	≤ 35
11	7 / Studio 71	32	≤ 35
12	9 / Studio 104	31	≤ 35

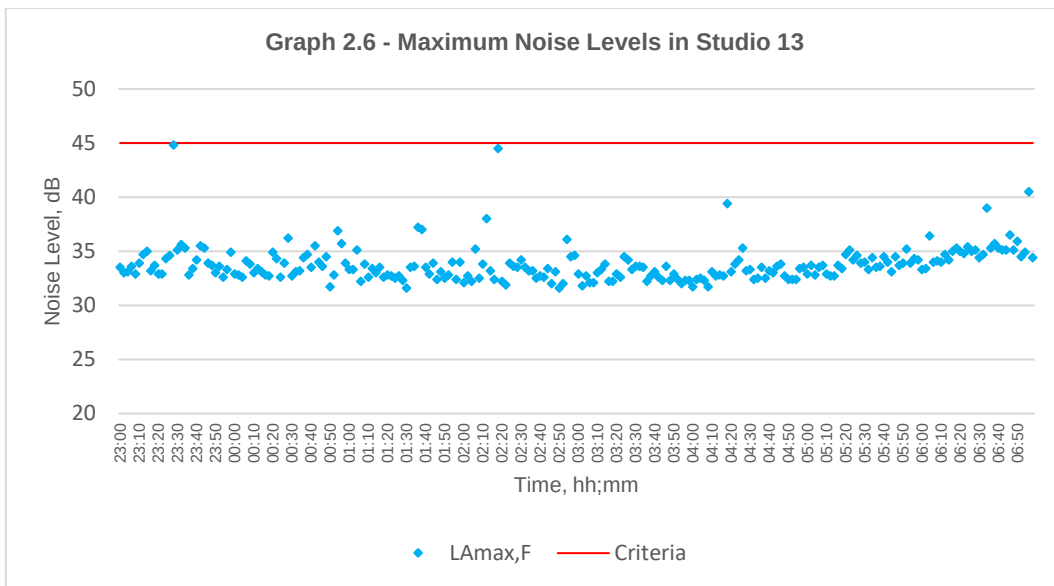
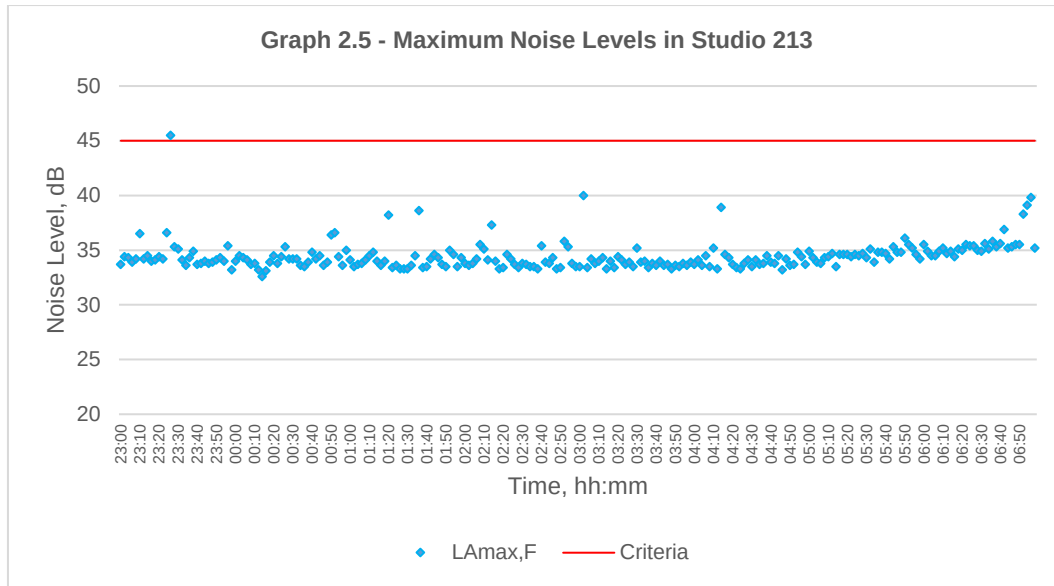
- 2.7 The short term measured daytime ambient noise levels presented in Table 2.2 are in line with long term measurements on the same elevation. Therefore, it expected that there would be the same reduction in daytime and night-time ambient noise levels in those rooms and the night-time ambient noise level limit would also be met.
- 2.8 The above demonstrates that the ambient noise level requirements were achieved during both the daytime and night-time periods in all the rooms tested.

Maximum Noise Levels

- 2.9 The maximum noise levels measured over two-minute sampling times in the four rooms during the night-time periods are presented in Graphs 2.1 to Graph 2.6, below. The night-time maximum noise level criteria of 45dBL_{Amax,F} is also presented on the graphs for reference purposes.







- 2.10 Based on the above dataset, there were fewer than 15 exceedances of 45dBL_{AFmax}, in each room during the night-time period assessed, therefore, the requirements have been met.

Block B

Measurement Details

- 2.11 Long term noise levels were measured by AEC between Wednesday 14th and Friday 16th August and Monday 19th and Tuesday 20th August in Studio apartments and Cluster bedrooms on the eleventh floor of Block B.. Additional long term measurements were undertaken in a Studio apartments on the southern elevation on the 21st and 3rd floors between Tuesday 14th and Thursday 16th October 2024.
- 2.12 Short term spot check measurements were also undertaken on the three other elevation during the daytime of Wednesday 15th October 2024. Please note that there external works being undertaken during these measurements which may contributed to measured level.

- 2.13 The location of the measurements is presented in Figure B.2 and the location and orientation of Block B in relation to the sources of external noise is presented in Figure B.3.

Ambient Noise Levels

- 2.14 The daytime and night-time internal ambient noise levels measured during the surveys are presented in Tables 2.3 and 2.4, along with the criteria for comparison purposes.

Table 2.3 – Measured Internal Ambient Noise Levels and Criteria

Test Ref:	Floor / Room	Noise Level, dBL _{Aeq, T}			
		Daytime (0700 – 2300h)		Night-time (2300 – 0700h)	
		Measured Level	Criteria	Measured Level	Criteria
13	11 / Studio 245	32 ¹	≤ 35	28	≤ 30
14	11 / Cluster 247/01	34 ¹	≤ 35	30	≤ 30
15	11 / Cluster 229/03	32 ²	≤ 35	28	≤ 30
16	11 / Cluster 249/05	33 ²	≤ 35	29	≤ 30
17	11 / Cluster 230/05	30 ²	≤ 35	25	≤ 30
18	3 / Studio 37	31 ¹	≤ 35	28	≤ 30
19	8 / Studio 167	31 ¹	≤ 35	29	≤ 30

¹1600-2300h

²1715-2300h

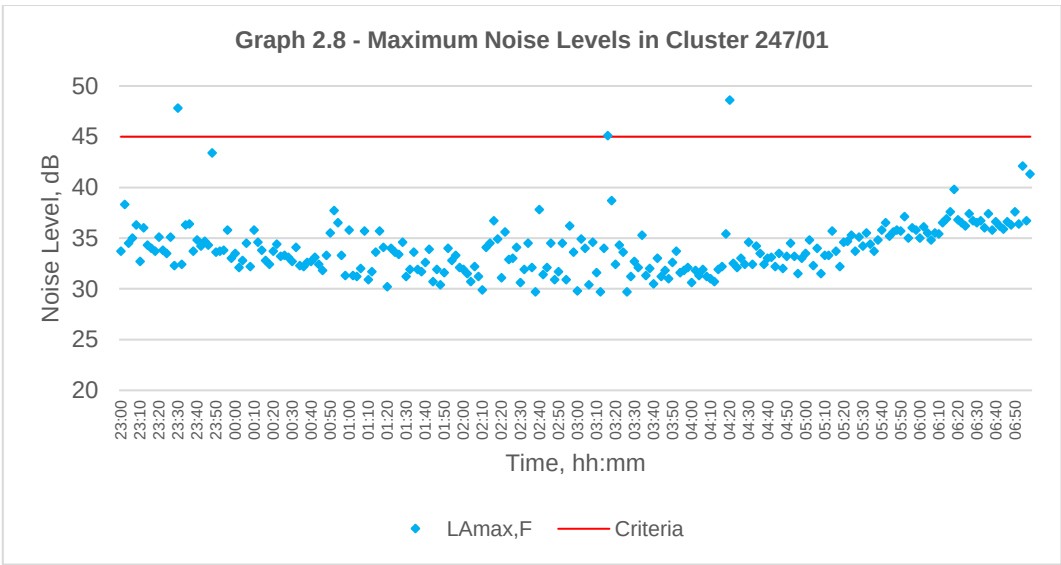
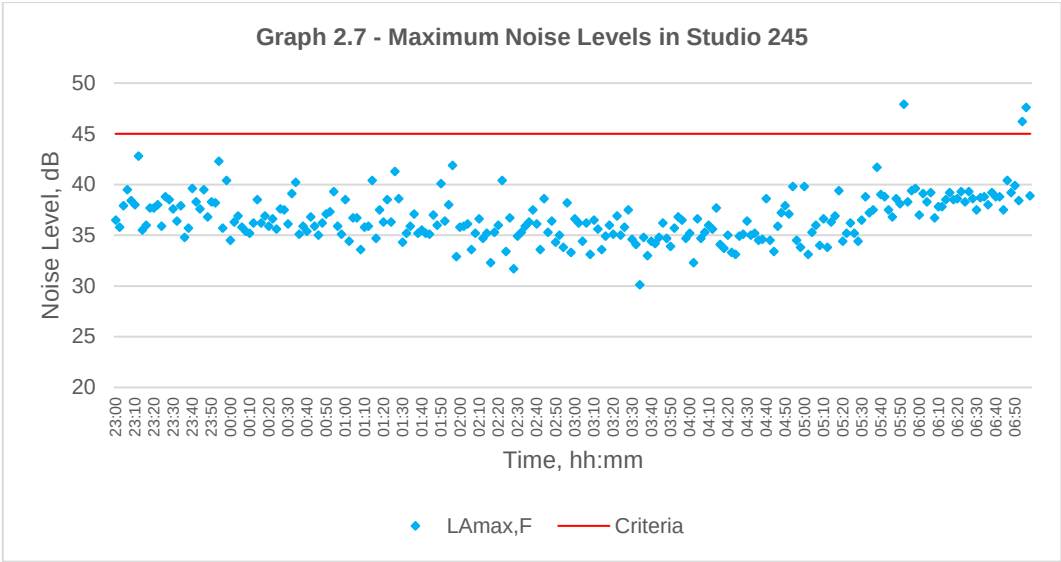
Table 2.4 – Short Term Measured Internal Ambient Noise Levels and Criteria

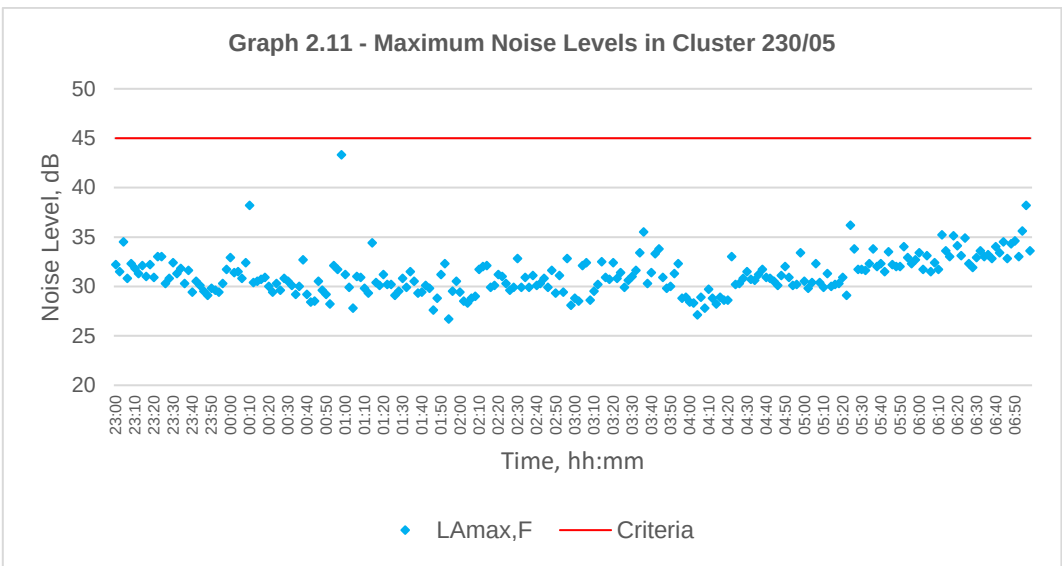
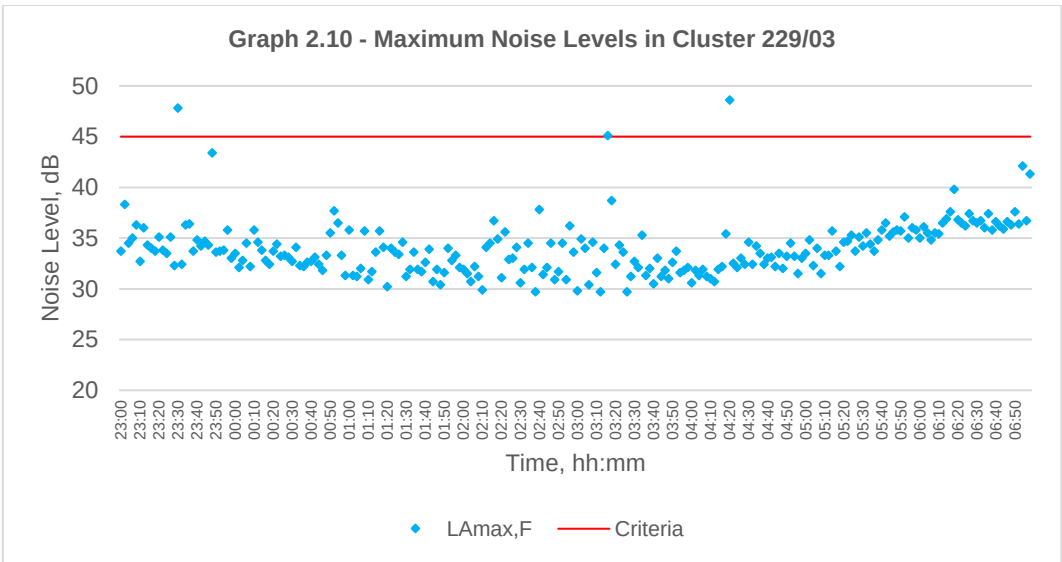
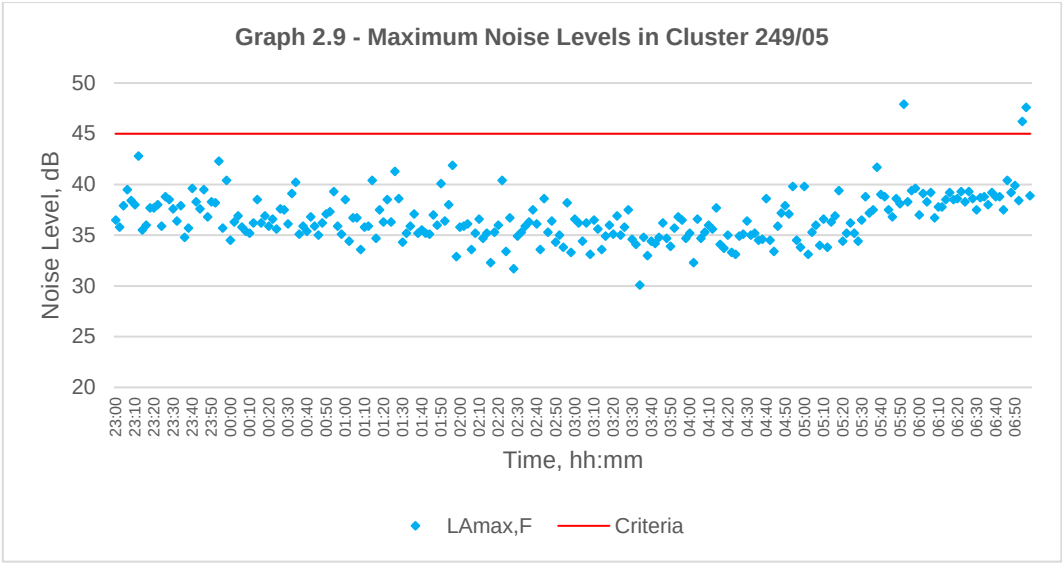
Test Ref:	Floor / Room	Noise Level, dBL _{Aeq, T}	
		Measured Level	Criteria
20	4 / Studio 52	30	≤ 35
21	4 / Studio 43	32	≤ 35
22	6 / Studio 103	30	≤ 35
23	7 / Cluster 145/03	33	≤ 35
24	7 / Studio 121	32	≤ 35
25	9 / Studio 198	33	≤ 35

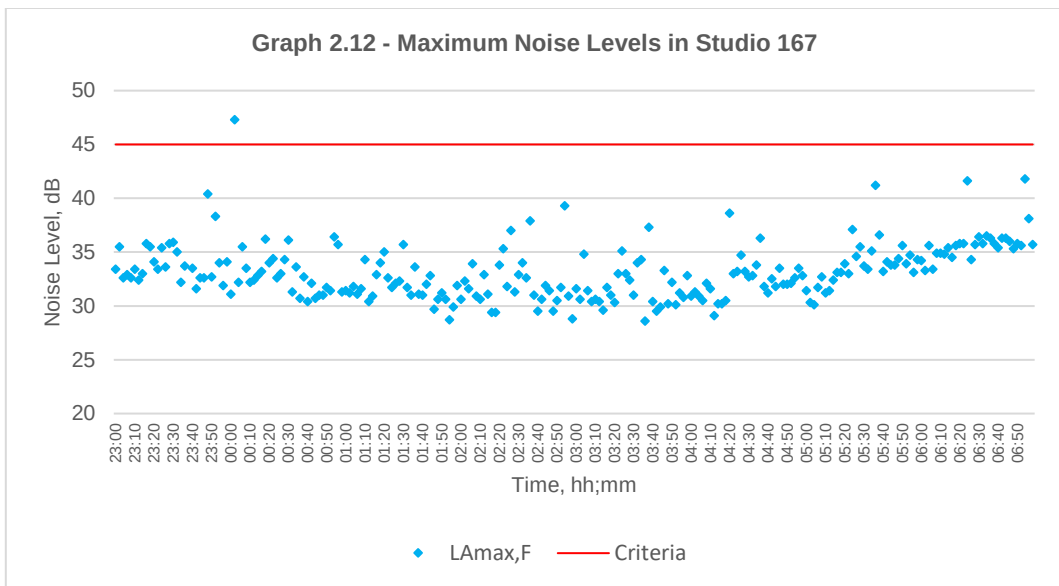
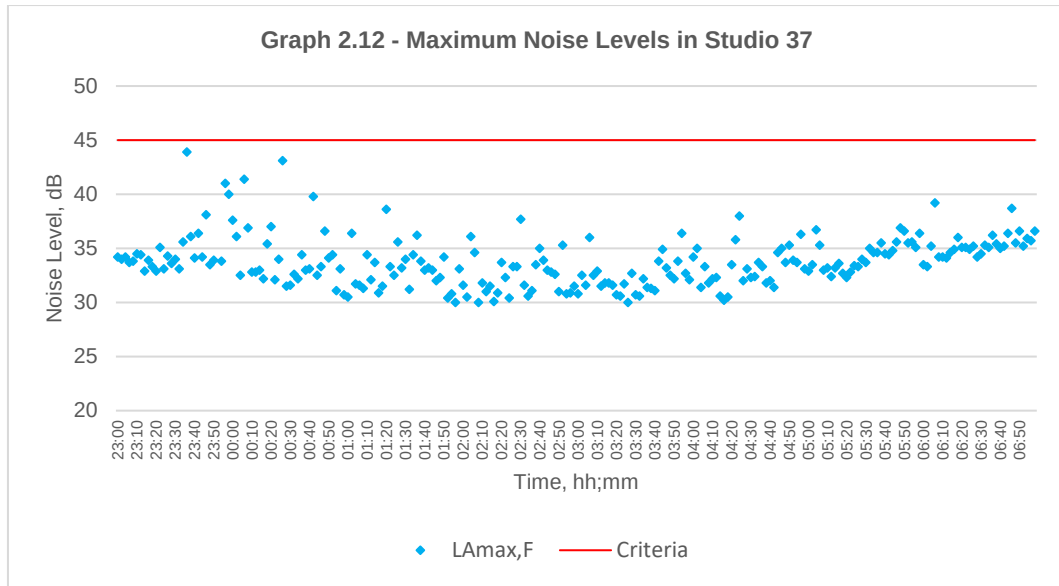
- 2.15 The short term measured daytime ambient noise levels presented in Table 2.4 are in line with long term measurements on the same elevation. Therefore, it expected that there would be the same reduction in daytime and night-time ambient noise levels in those rooms and the night-time ambient noise level limit would also be met.
- 2.16 The above demonstrates that the ambient noise level requirements were achieved during both the daytime and night-time periods in all the rooms tested.

Maximum Noise Levels

2.17 The maximum noise levels measured over two-minute sampling times in the four rooms during the night-time periods are presented in Graphs 2.7 to Graph 2., below. The night-time maximum noise level criteria of 45dB_{L_{Amax,F}} is also presented on the graph for reference purposes.







2.18 Based on the above dataset, there were fewer than 15 exceedances of 45dB L_{Amax,F}, in each room during the night-time period assessed, therefore, the requirements have been achieved.

Summary and Conclusion

2.19 The above assessment demonstrates that internal ambient and maximum noise levels comply with the requirements of Condition 16 in rooms on each elevation of Blocks A and B.

2.20 As a result, Condition 16 can be discharged.

Appendix A – Calibration Certificates

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

Page 1 of 2

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	SDG1XDDQ8R6309
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 10 January 2024 CERTIFICATE NUMBER 206756



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

Page 1 of 2

Test engineer:
D. Swahell
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc
Model: MK224
Serial Number: 206255A

Calibration procedure

Date of calibration: 10 January 2024
Open circuit: 32.9 mV/Pa
Sensitivity at 1 kHz: -29.7 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: 39.0 %

CERTIFICATE OF CALIBRATION

Certificate Number:

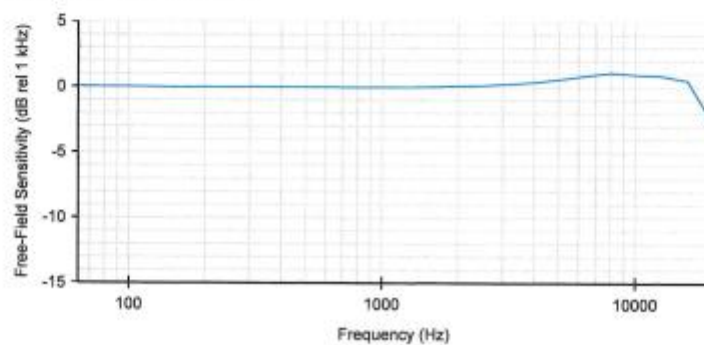
206756

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Free-Field Frequency Response : Tabular

Frequency (Hz)	Free-Field Sensitivity (dB rel 1 kHz)	Actuator Response (dB)
63	0.06	-0.19
80	0.05	-0.09
100	0.05	-0.04
125	0.04	-0.01
160	0.00	-0.02
200	0.02	0.02
250	0.01	0.01
315	0.03	0.01
400	0.00	0.00
500	0.01	-0.00
630	0.00	-0.00
800	-0.00	-0.02
1 000	0.00	-0.02
1 250	0.01	-0.04
1 600	0.04	-0.07
2 000	0.10	-0.09
2 500	0.16	-0.15
3 150	0.25	-0.26
4 000	0.40	-0.43
5 000	0.61	-0.64
6 300	0.88	-1.08
8 000	1.12	-1.96
10 000	0.98	-3.72
12 500	0.91	-5.60
16 000	0.54	-7.41
20 000	-2.39	-11.44

Free-Field Frequency Response : Graphical

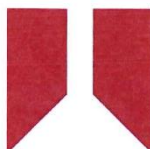


CERTIFICATE OF CALIBRATION

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

Page 1 of 2

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

Page 2 of 2

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

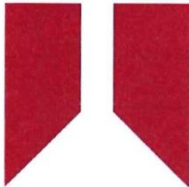
	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	94.00	94.05	94.04	94.05	94.05	0.05	±0.40	0.11 dB
Distortion (%)	< 3.00	0.90	0.93	0.93	0.92	0.92	+3.00	0.13 %
Frequency (Hz)	1000.0	1004.4	1005.0	1004.4	1004.6	4.6	±10.0	0.1 Hz

End of results

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **06 September 2023** CERTIFICATE NUMBER **198670**



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

Page 1 of 2

Approved signatory

R.Thomas

Electronically signed:

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171B	
Serial number:	G056597	
Class:	1	
Firmware version:	3.2.3254	

Test summary

Date of calibration: 04 September 2023

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

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CERTIFICATE OF CALIBRATION

Certificate Number:

198670

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Environmental conditions

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

Before Pressure: 101.79 kPa Temperature: 21.6 °C Humidity: 46.6 %
After Pressure: 101.76 kPa Temperature: 21.2 °C Humidity: 43.2 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001681
Attenuator	Cirrus Research	ZE:952	64370
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: 3277F

Microphone

Model: MK:224

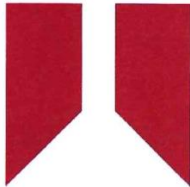
Serial number: 216585D

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**
DATE OF ISSUE **24 August 2023** CERTIFICATE NUMBER **198672**



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

Page 1 of 2

Test engineer:
D.Swalwell
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc
Model: MK:224
Serial Number: 216585D

Calibration procedure

Date of calibration: 24 August 2023
Open circuit: 49.5 mV/Pa
Sensitivity at 1 kHz: -26.1 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: 100.40 kPa
Temperature: 23.0 °C
Humidity: 62.0 %

CERTIFICATE OF CALIBRATION

Certificate Number:

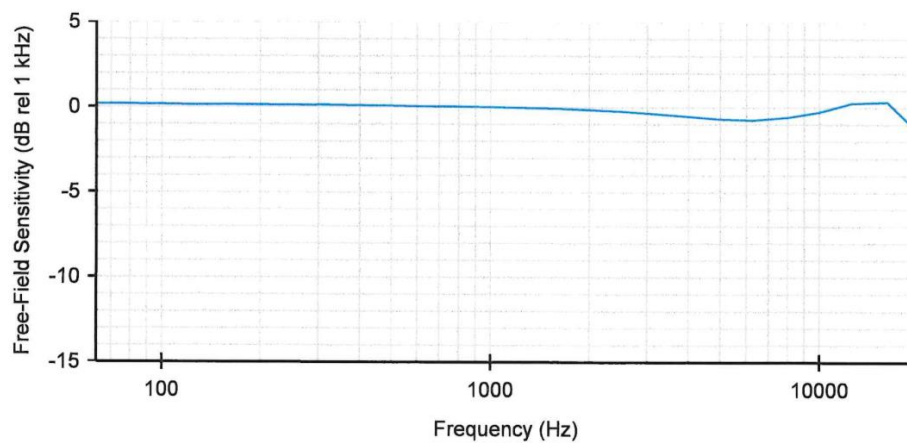
198672

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Free-Field Frequency Response : Tabular

Frequency (Hz)	Free-Field Sensitivity (dB rel 1 kHz)	Actuator Response (dB)
63	0.17	-0.06
80	0.17	0.04
100	0.15	0.07
125	0.13	0.10
160	0.13	0.13
200	0.12	0.13
250	0.10	0.12
315	0.12	0.12
400	0.09	0.11
500	0.08	0.09
630	0.03	0.04
800	0.04	0.04
1 000	0.00	-0.01
1 250	-0.04	-0.07
1 600	-0.09	-0.19
2 000	-0.15	-0.34
2 500	-0.24	-0.54
3 150	-0.39	-0.88
4 000	-0.54	-1.35
5 000	-0.70	-1.93
6 300	-0.76	-2.70
8 000	-0.58	-3.64
10 000	-0.28	-4.97
12 500	0.24	-6.26
16 000	0.32	-7.62
20 000	-1.39	-10.43

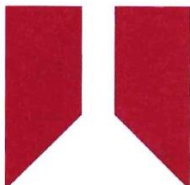
Free-Field Frequency Response : Graphical



CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research**

DATE OF ISSUE **06 September 2023** CERTIFICATE NUMBER **198673**



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

Page 1 of 2

Approved signatory

R.Thomas

Electronically signed:

Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc

Notes:

Model: CR:515

Serial number: 56719

Class: 1

Test summary

Date of calibration: 05 September 2023

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.

As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC60942_2003 Annex A to Class 1. This has been confirmed by Laboratoire National d'Essais (LNE), Physikalisch-Technische Bundesanstalt (PTB) and APPLUS (APPLUS).

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:
198673

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Environmental conditions

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

Pressure: 101.36 kPa
Temperature: 23.6 °C
Humidity: 51.4 %

Test equipment

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

Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Tolerance	Uncertainty
Level (dB)	94.00	94.06	94.05	94.04	94.05	0.05	±0.40	0.11 dB
Distortion (%)	< 3.00	0.20	0.35	0.13	0.23	0.23	+3.00	0.13 %
Frequency (Hz)	1000.0	1000.3	1000.3	1000.3	1000.3	0.3	±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.

End of results

Appendix B – Figures

Figure B.1 – Indicative Location of Test Rooms in Block A



Figure B.2 – Indicative Location of Test Rooms in Block B



