Noise report

The Hope, Fitzrovia - external cellar cooling unit

Site address: 15 Tottenham Street, London W1T 2AJ

Local authority: London Borough of Camden

Agent: Taylor and Co Architects, The Studio, Ombersley, Worcestershire, WR9 0DT

Document Ref: WA/0424/NR-426

Prepared by: Nick Myerscough MIOA MA

Date: 07/04/2024

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1 Introduction and summary

Walnut Acoustics have been engaged to assess an externally mounted cellar cooling unit at the rear of The Hope public house in Fitzrovia. The site was attended on Sunday 7th and Monday 8th January 2024, to survey the installation and to carry out a series of noise measurements.

The nearest residential noise sensitive receptor (NSR) was identified as a rear façade window in the adjacent residential property at No.17 Tottenham Street.

As recommended in the local authority planning guidance, the fan unit has been assessed with BS 4142 methodology to evaluate the noise impacts at this NSR, and the results are summarised below.

Noise Source	Noise impact assessment at NSR	Mitigation
External cellar cooling unit *Daytime operation - unit switched off at night* Searle MSA114-GSL	The BS 4142 daytime assessment level at the nearest residential NSR is +21 dB when comparing the rating level of the cooling unit to background noise levels. Significant adverse impacts are expected in the context of the existing noise climate. The mitigated assessment level is 4 dB below background noise levels. The potential for noise impacts is low with no adverse impacts expected at the nearest NSR.	An Environ acoustic enclosure for the cooling unit with a minimum sound reduction value of 25 dB has been proposed. The specialist has been consulted to ensure an effective solution is designed, manufactured, and installed correctly.

Table 1: Noise impact assessment – noise source, impact assessment and mitigation

A BS 4142:2014+A1:2019 assessment level of +21 dB indicates that significant adverse impacts are expected at the nearest residential NSR, in the context of the existing noise climate.

An Environ acoustic enclosure with a minimum sound reduction value of 25dB has been proposed to reduce the cooling unit noise rating level at the nearest residential NSR to 4 dB below the background noise level. The mitigated assessment indicates that the potential for noise impacts would be low with no adverse impacts on nearby residents expected.

2 Guidance and standards

BS 4142:2014+A1:2019: *Methods for rating and assessing industrial and commercial sound*

In line with current government guidance, the Noise Policy Statement of England (*NPSE 2010*) and the National Planning Policy Framework (*NPPF 2018*) this standard assesses whether industrial and commercial sound sources can potentially affect the health and well-being of those exposed to them.

This British standard describes methods for rating and assessing sound of an industrial and/or commercial nature which includes:

- *Sound from industrial and manufacturing processes;*
- *Sound from fixed installations which comprise mechanical and electrical plant and equipment;*
- *Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and;*
- *Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes…*

The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The standard provides a method for creating a rating level for the commercial or industrial sound source under scrutiny and then compares this to representative background noise levels (L_{A90}) at nearby Noise Sensitive Receptors (NSRs), usually dwellings.

The standard compares the average noise levels (L_{Aeq}) for a one-hour assessment period during the day (0700 – 2300 hours) and a fifteen-minute period during the night (2300 – 0700 hours) for the noise source in operation, the *Specific Noise Level*, with the existing background noise level (L_{A90}) when the noise source is not operating.

As part of the assessment, consideration is also given to the character or acoustic features of the noise in terms of:

<u>Tonality</u>

For sound ranging from not tonal to prominently tonal, the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be allocated as a penalty of +2 dB for a tone which is just perceptible at the NSR, +4 dB where it is clearly perceptible and +6 dB where it is highly perceptible.

<u>Impulsivity</u>

A correction of up to +9 dB can be applied for sound that is highly impulsive considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be allocated as a penalty of 3 dB for impulsivity which is just perceptible at the NSR, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Intermittency

When the specific sound has identifiable on/off conditions…if the intermittency is readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied.

Assessment Level	Likely impact on health and well-being
Around + 10 dB or more	Likely to be an indication of a significant adverse impact, depending on the context.
Around + 5 dB	Likely to be an indication of an adverse impact, depending on the context.
Below + 5 dB	The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
Background level or lower	Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Table 2: BS 4142 Assessment levels – likely impact descriptions as described in the standard

The difference between the rating level and the background level (assessment level) is assessed in terms of the potential effect of the noise source on the health and well-being of residents within the context of the local noise climate and the site under assessment.

This ranges from no observed effect to possible adverse or significantly adverse impacts from noise levels on NSRs which may require mitigation. The table above summarises the BS 4142 guidance on assessment levels.

3 Site details and operational hours

The pictures below show the location of the nearest residential NSR, and the external cellar cooling unit.

Picture 1: Residential NSR and external cellar cooling unit locations

Operational hours

The fan unit is set to switch off overnight. When measured on site the fan stopped running at 2052 in the evening and re-started at 0945 in the morning.

See Appendix 3 for the cooling unit measurement data summary.

4 Measurement details

4.1 Personnel and equipment

All testing, calculation and evaluation was conducted by Nick Myerscough of Walnut Acoustics. Nick is a Member of the Institute of Acoustics (MIOA).

Contact Details:

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Walnut Acoustics
3 Furrow Way
Mickleton
Chipping Campden
Gloucestershire
GL55 6TW

t: 01386 438722 m: 07811 382738 e: nick@walnutacoustics.co.uk

Equipment Specifications:

Measurement Device	Serial Number	Calibration Date	Calibration Certificate No.
Cirrus Research CR:171B Class 1 Integrating Sound Level Meter	G056153	28/09/22	180693
Cirrus Research CR:515 Acoustic Calibrator	43622	28/09/22	180692

Table 3: Measurement equipment details

Copies of current equipment calibration certificates can be found in Appendix 4.

4.2 Weather conditions

Measurement	Date	Temperature Range	Windspeed Direction	Visibility	Cloud Cover Precipitation
External cellar cooling unit	07/01/24 to 08/01/24	2 to 5°C	3 to 5 m/s N to NE	Very Good	30 to 50% No rain

Table 4: Weather conditions during measurement period

4.3 Methodology

A Cirrus Research CR:171B Class 1 sound level meter was deployed at 1 metre from the fan on the cooling unit to measure background and fan noise levels.

Care was taken to eliminate external influences on the measurements by the application of a windshield to the sound level meter, and wind speeds and weather conditions were observed for external measurements.

Calibration was performed before and after each measurement or set of measurements with no notable drift. A drift of up to 0.5dB is considered reasonable and is generally the cause of gradients in variables such as temperature, humidity, and battery power.

Picture 2: external cellar cooling unit - noise measurement position

5 Measurement summary

External plant	Date	Start Time	Duration hr:min:sec	$L_{Aeq,T}$ dB
External cellar cooling unit **Searle MSA114-GSL** *Measured at 1m from fan centre*	07/01/24	17:01:58	03:31:52	**66.8**

Table 5: external cellar cooling unit - site measurement at 1 metre

Unweighted octave band sound pressure data - external cellar cooling unit at 1 metre

Frequency Hz	63	125	250	500	1000	2000	4000	8000
External cellar cooling unit **Searle MSA114-GSL** *Measured at 1m from fan centre*	67.6	75.1	68.1	64.2	60.7	57.1	51.1	41.2

Table 6: Unweighted octave band sound pressure values for cellar cooling unit – levels in dB

Representative background noise level	L_{A90} dB
Daytime	**42**

Table 7: representative daytime background noise level used for BS 4142 assessment

Note: the background noise level is based on analysis of the measurement data in the absence of fan noise from the external cellar cooling unit.

See Appendix 3 for the noise measurement data summary. Further information on the data presented above can be provided on request.

6 Noise impact assessment: BS 4142:2014+A1:2019

This assessment considers the fan noise being generated from the external cellar cooling unit, and the potential for noise impacts at the nearest residential NSR as detailed in the table below.

NSR	Distance from centre of fan metres
Residential window at No.17 Tottenham Street	**2**

Table 8: NSR – description and distance to centre of cooling unit fan.

6.1 Acoustic feature corrections

Source	Tonality	Impulsivity	Intermittency	Other Character	Total
External cellar cooling unit **Searle MSA114-GSL**	+ 2	-	-	-	**+ 2**

Table 9: BS 4142 Acoustic feature corrections – shown in dB

The cooling unit noise source has been assessed for acoustic features as per BS 4142 guidelines and dB corrections are detailed in the table above. Lower frequency tonal content from fan noise has attracted a +2 dB tonality correction.

6.2 Noise impact assessment

A worst-case daytime scenario has been assessed over a 1-hour period with the cooling unit fan assumed to be running continuously. The table below details the noise source assessed, specific noise level, distance adjustment for noise propagation to the NSR, acoustic feature correction and the noise rating level at the NSR.

Noise Source	Specific Noise Level $L_{Aeq,T}$ dB	Distance adjust to NSR dB	Acoustic Feature Correction dB	Rating Level NSR dB
External cellar cooling unit **Searle MSA114-GSL**	67	- 6	+ 2	**63**

Table 10: specific noise and rating levels for fan unit noise – 1-hour daytime assessment

Note 1: distance correction to NSR assumes standard point source propagation.

Note 2: the specific noise level used is the average fan noise level presented in table 5, rounded.

The representative background noise level (L_{A90}) used in this assessment is detailed in table 7 of the measurement summary section.

Assessment Location	Rating Level at NSR dBA	Background noise level dBA	Assessment level dB
NSR	63	42	**+ 21**

Table 11: BS 4142 – daytime rating, background and assessment levels at the NSR

A BS 4142:2014+A1:2019 daytime assessment level of +21 dB indicates the potential for significant adverse noise impacts from the external cellar cooling unit at the nearest residential NSR, in the context of the existing noise climate and without mitigation.

Uncertainties in this BS 4142 assessment do exist in terms of potential seasonal and future variance of background levels.

7 Mitigation and assessment

The BS 4142 noise assessment above indicates the need for mitigation of the fan noise generated from the external cellar cooling unit. The following noise reduction solution is proposed:

- An Environ acoustic enclosure for the fan unit to provide a minimum sound reduction value of 25 dB. The specialist has been consulted to ensure an effective solution is designed, manufactured, and installed correctly (see Appendices 1 and 2 for site layout and enclosure design drawings).

The rating level at the NSR has been re-calculated and re-assessed with this mitigation in place as shown in the table below.

Assessment Location	Rating Level at NSR dB	Background noise level dBA	Assessment level dB
NSR *Daytime*	38	42	**- 4**

Table 12: BS 4142 - daytime rating, background and assessment levels at nearest residential NSR

Low noise impacts from the external cellar cooling unit are expected at the nearest residential NSR with the recommended mitigation in place. No adverse impacts are expected with the noise rating level 4dB below the background noise level.

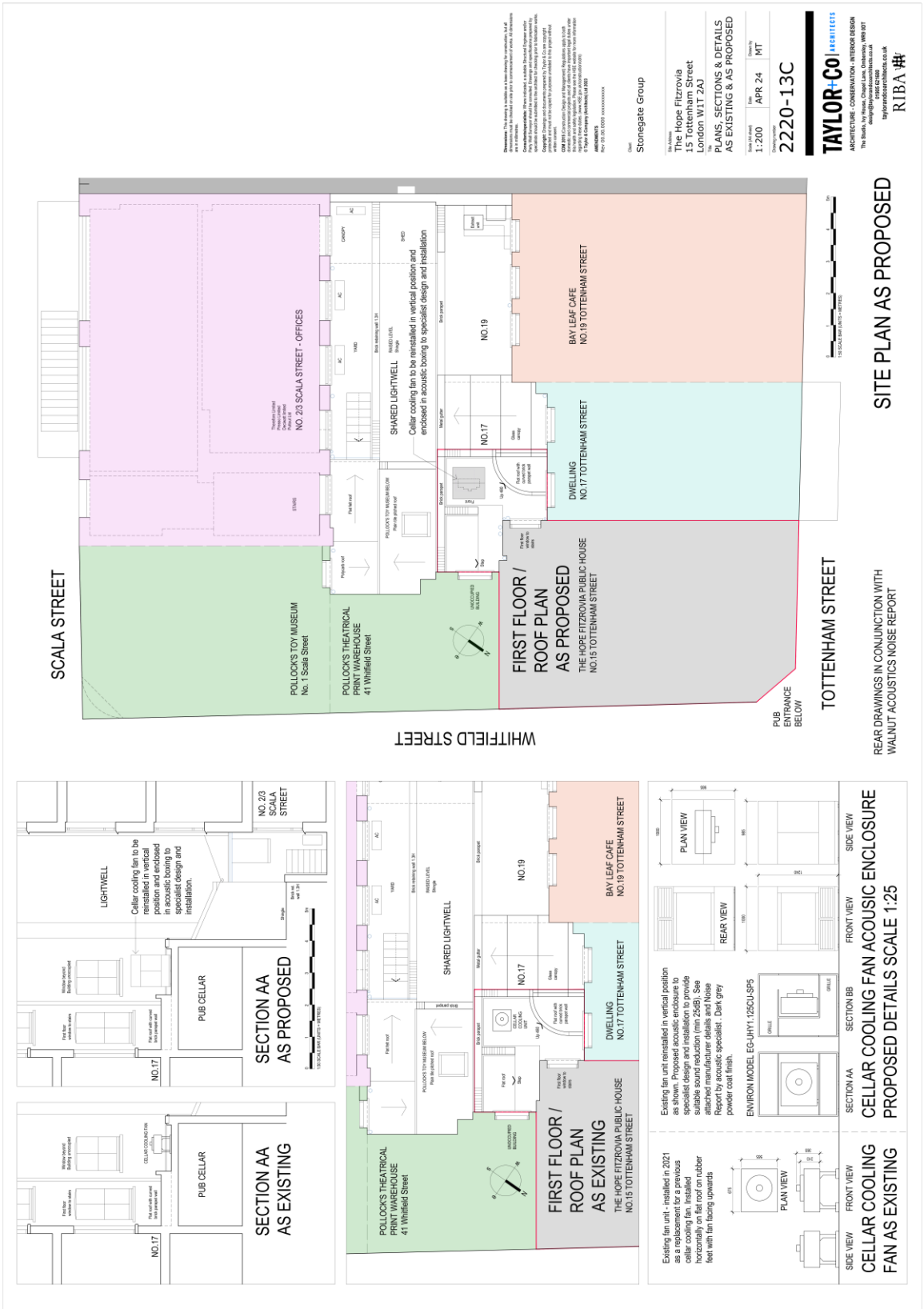
8 Conclusion

A BS 4142:2014+A1:2019 assessment level of +21 dB indicates that significant impacts are expected at the nearest residential NSR, in the context of the existing noise climate.

An acoustic enclosure with a minimum sound reduction value of 25dB has been proposed to reduce the noise rating level of the cooling unit at the nearest residential NSR to 4 dB below the background noise level. The mitigated assessment indicates that the potential for noise impacts would be low with no adverse impacts on nearby residents expected.

Appendix 1: Architect drawings

Plans - sections and details - existing and proposed



Appendix 2: Environ enclosure design

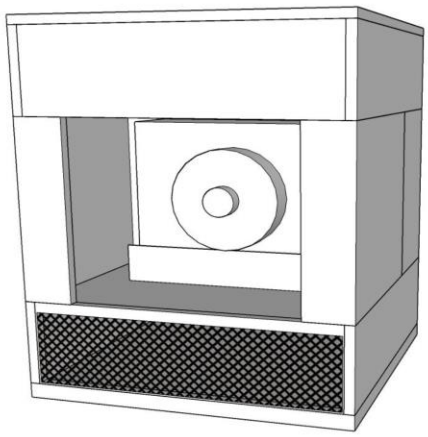
environ group

+ 44 (0) 20 3540 7179
www.environgroup.uk

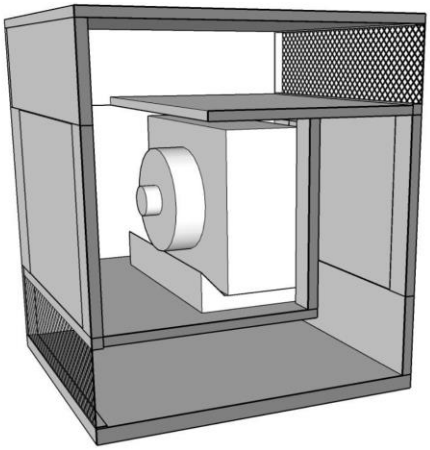
DATA SHEET

Model: EG-UHY1.1.25CU-SP5
Acoustic Enclosure

25 January 2024



Service/Maintenance Access via lift off or hinged doors to front and side elevations
Fan Access via removable internal panels



Ambient Air via low level horizontal duct arrangement - Dischage Air through high level horixontal duct arrangement
Internal Plenum/Septum Panels with integrated rubber edge seals ensure no air recirculation

Maintenance Via lift of ddors to front and rear

HSA

MADE IN BRITAIN

Appendix 3: Noise measurement summary

17/01/2024

Cirrus Research plc

Measurement Time History Report

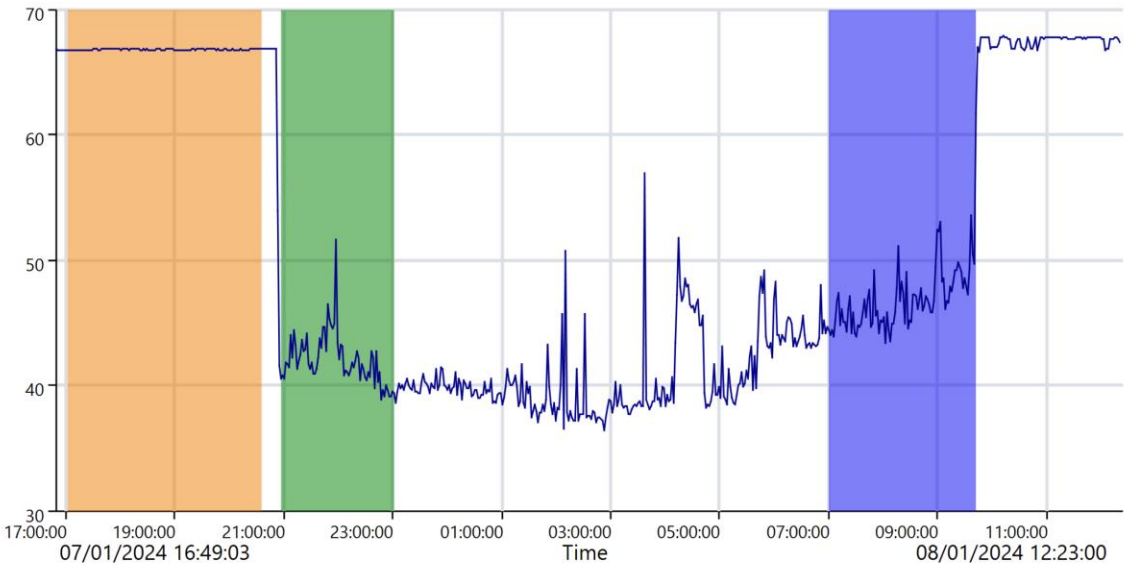
Name	fan unit at 1 metre - on stand			
Time	07/01/2024 16:49:03	**Person**	**Place**	**Project**
Duration	19:33:57	Nick Myerscough	Walnut Acoustics	The Hope - Fitzrovia
Instrument	G056153, CR:171B			

Calibration

Before	07/01/2024 16:42	Offset	0.29 dB	**After**	08/01/2024 12:26	Offset	0.57 dB

Period 07/01/2024 16:49:03 - 08/01/2024 12:23:00

Legend	LAeq
Value	62.5 dB



These values have been recalculated due to the large number of samples displayed.

ReportId

MB9C20100001851 Cirrus Research NoiseTools Page 1 of 2

17/01/2024

cellar fan unit

Start Time	End Time	LAeq (dB)	LAF90 (dB)
07/01/2024 17:01:58	07/01/2024 20:33:50	66.8	67.0
	Total	66.8	67.0

Total Duration	03:31:52
Count	1

daytime BG - morning - no fan

Start Time	End Time	LAeq (dB)	LAF90 (dB)
07/01/2024 20:57:57	07/01/2024 23:00:00	42.7	39.8
	Total	42.7	39.8

Total Duration	02:02:03
Count	1

daytime BG - evening - no fan

Start Time	End Time	LAeq (dB)	LAF90 (dB)
08/01/2024 07:00:00	08/01/2024 09:40:00	47.3	43.9
	Total	47.3	43.9

Total Duration	02:40:00
Count	1

All Markers

	LAeq (dB)	LAF90 (dB)
Remainder	61.9	38.2
Total	63.1	41.4

ReportId

Appendix 4: Measurement equipment calibration certificates

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 September 2022** CERTIFICATE NUMBER **180693**

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: G056153
Class: 1
Firmware version: 3.2.3197

Test summary

Date of calibration: 28 September 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

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 September 2022** CERTIFICATE NUMBER **180694**

Cirrus Research plc
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: 216345A

Calibration procedure

Open circuit: 48.6 mV/Pa

Sensitivity at 1 kHz: -26.3 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: 100.60 kPa

Temperature: 22.0 °C

Humidity: 63.0 %

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **28 September 2022** CERTIFICATE NUMBER **180692**

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: Cirrus Research plc **Notes:**
Model: CR:515
Serial number: 43622
Class: 1

Test summary

Date of calibration: 28 September 2022

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 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), PhysikalischTechnische Bundesanstalt (PTB) and APPLUS (APPLUS).

Notes:

Appendix 5: Disclaimer

Recommendations in this report are for acoustics purposes only, and it is the responsibility of the client, project manager, construction company or architect to ensure that all other requirements are met including (but not limited to) structure, fire, and Building Controls.

The calculations within this report are based upon sourced and/or calculated data. Complex flanking transmission paths through structures can lead to excessive vibration transmission. Also, build quality can greatly affect final sound levels and Walnut Acoustics takes no responsibility for the integrity of any physical work carried out. All reasonable and practicable installation techniques should be employed with noise reduction in mind including the use of isolation and anti-vibration materials in the mounting of all parts of any mechanical systems.

The opinions and interpretations presented in this report represent our best technical interpretation of the data made available to us. However, due to uncertainty inherent in the estimation of all parameters, we cannot, and do not, guarantee the accuracy or correctness of any interpretation. We shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, cost, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents, or employees.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. If additional information becomes available which may affect our comments, conclusions or recommendations, the author reserves the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

Except for the provision of professional services on a fee basis, Walnut Acoustics does not have a commercial arrangement with any person or company involved in the interests that are the subject of this report.

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All data and mathematical content in this report has been checked thoroughly and is believed to be accurate at the time of issue. Errors and Omissions excepted.