



Report for the Results of the Environmental Noise Survey Undertaken for ITM Power, Shepcote Lane, Sheffield.

Monitoring Date(s): 2nd August 2022 – 3rd August 2022

Contract Reference: 17220

Client Name: ITM Power

Client Address: 2 Bessemer Park
Shepcote Lane
Sheffield
S9 1DZ

Monitoring Organisation: Synergy Environmental Solutions Limited
Silverdale Enterprise Centre
Kents Lane
Newcastle-under-Lyme
Staffordshire
ST5 6SR

Date of Report: 24 August 2022

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Executive Summary

Synergy Environmental Solutions Limited were appointed by Mr. Luke Shaw of ITM Power to undertake an environmental noise survey at the company's Shepcote Lane site, Sheffield.

The purpose of the survey was to establish background and residual sound levels whilst the company's Shepcote Lane site was on shutdown and not producing any noise.

These levels will later be compared to measurements taken while the site is operational; comparing these levels from these two measurement periods, a full BS 4142 assessment will be produced. This report presents the overall methodology, results and calculations from the survey.

The site work was undertaken by Mr. Aidan Willis on the 2nd and 3rd of August 2022.

The full results from the assessment are shown as a time history of L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} given in Appendix 1.

Location	L_{Aeq}	L_{Amax}	L_{A90}
Greasbro Road, Day Survey	63dB	87dB	58dB
Greasbro Road, Night Survey	54dB	66dB	48dB
Ingfield Avenue, Day Survey	61dB	84dB	59dB
Ingfield Avenue, Night Survey	55dB	66dB	51dB
Oxted Road / Jenkin Road, Day Survey	66dB	86dB	52dB
Oxted Road / Jenkin Road, Night Survey	53dB	74dB	37dB

1. Introduction

Synergy Environmental Solutions Limited were appointed by Mr. Luke Shaw of ITM Power to undertake an environmental noise survey at the company's Shepcote Lane site, Sheffield.

The purpose of the survey was to establish background and residual sound levels whilst the company's Shepcote Lane site was on shutdown and not producing any noise. These levels will later be compared to measurements taken while the site is operational; comparing these levels from these two measurement periods, a full BS 4142 assessment will be produced. This report presents the overall methodology, results and calculations from the survey.

The site work was undertaken by Mr. Aidan Willis on the 2nd and 3rd of August 2022.

2. Details of Sources

Main sound sources of the specific sound	Air releases from the purging process
Hours of operation	Up to 24/7
Statement of operational rates	The purging process will operate for thirty to sixty seconds before a test is conducted. Sounds of the purging process will emit from the outlets, which are located in the car park.
Description of premises	ITM Power's Shepcote site is a large unit located just off junction 34 of the M1. The site is surrounded by a mix of residential, industrial and commercial premises

3. Subjective Impressions

Dominance or audibility of the specific sound	The specific sounds produced by ITM Power were not present during this survey and therefore no subjective impression can be given
Main sources contributing to the residual sound.	Road traffic noise from the M1 and local routes

4. Receptors

4.1 Greasbro Road

Sensitivity of receptor	Residential Property
Measurement Location	Sampling was undertaken at the nearest residential property, 52 Greasbro Road, with the microphone positioned at a height of 1.4m, positioned at least 3.5m away from reflecting facades. The exact sampling position was based on accessibility and safety and collecting representative noise data at the nearest noise sensitive receiver to the plant.
Topography of Intervening Ground	The intervening ground consists of ITM's car park and another industrial unit. This area is topographically flat.
Reason for choice of measurement location	Residual measurements were taken at the nearest sensitive receptor. This was 52 Greasbro Road. This location was chosen over 4 Greasbro road as the acoustic panelling at the rear of the properties differed in height, and as such it is predicted that 4 Greasbro Road would be less impacted by sounds generated at ITM Power.

4.2 Ingfield Avenue

Sensitivity of receptor	Residential Properties
Measurement Location	Sampling was undertaken in an additional residential area, Ingfield Avenue, with the microphone positioned at a height of 1.4m, positioned at least 3.5m away from reflecting facades. The exact sampling position was based on accessibility and safety and collecting representative noise data at the nearest noise sensitive receiver to the plant.
Topography of Intervening Ground	The entry and exit slip roads of junction 34 of the M1 separate ITM Power from the properties at Infield Avenue. The M1 is topographically higher than these two points and breaks the direct sound propagation path.
Reason for choice of measurement location	Residual measurements were taken at an additional noise sensitive receptor.

4.3 Jenkin Hill (Oxted Road / Jenkin Road)

Sensitivity of receptor	Residential Properties
Measurement Location	Sampling was undertaken in an additional residential area, Jenkin Hill, with the microphone positioned at a height of 1.4m, positioned at least 3.5m away from reflecting facades. The exact sampling position was based on accessibility and safety and collecting representative noise data at the nearest noise sensitive receiver to the plant.
Topography of Intervening Ground	The intervening ground lowers before raising back up, effectively creating an acoustic shadow zone where the Meadowhall Shopping Centre is. Sounds produced at ITM power will have a direct sound propagation path to properties on Jenkin Hill.
Reason for choice of measurement location	Residual measurements were taken at an additional noise sensitive receptor.

5. Sound Measurement Equipment

The measurement equipment listed in the table below was used during the survey. The equipment complies with BS EN 60942:2018 and BS EN 61672-1 :2013. The equipment calibration was verified before and after the survey.

Type	Serial Number	Last Calibration
Cirrus Research CR:171B Conforming to BS EN 61672-1:2013	G301381	7 th July 2021
Cirrus Research Acoustic Calibrator CR:515 Conforming to BS EN 60942:2018	69420	7 th July 2021
Calibrator Reference Level	94dB	Start of day survey: 0.08dB End of day survey: 0.56dB Start of night survey: 0.22dB End of night survey: 0.26dB

6. Weather Conditions

The following weather conditions were recorded during the measurements:

Wind Speed	Day Survey: Typically 1.6ms ⁻¹ , a maximum of 6.2ms ⁻¹ for a short period during the Oxted Road / Jenkin Road measurement period Night Survey Maximum of 1.8ms ⁻¹
Wind Direction	Day Survey Mixed direction, west and easterly wind Night Survey Easterly
Temperature	Day Survey Start: 24.5°C End: 29°C Night Survey Start: 26.2°C End: 24°C
Estimated Cloud Cover	Day Survey Start: 7 Oktas End: 6 Oktas Night Survey Start: 6 Oktas End: 7 Oktas
Precipitation	Day Survey Some precipitation during the Gresbro Road measurement Night Survey None
Ground condition	Day Survey Wet during the morning period, drying up towards the end of the measurement period Night Survey Dry

7. Results

The full results from the assessment are shown as a time history of L_{Aeq} , L_{Amax} , L_{A10} and L_{A90} given in Appendix 1.

Day Survey

Time interval for the day survey was chosen to be 1 hour, as required by BS4142.

Location	L_{Aeq}	L_{Amax}	L_{A90}
Greasbro Road	63dB	87dB	58dB
Ingfield Avenue	61dB	84dB	59dB
Oxted Road / Jenkin Road	66dB	86dB	52dB

Night Survey

Time interval for the night survey was chosen to be 1 hour, as required by BS4142.

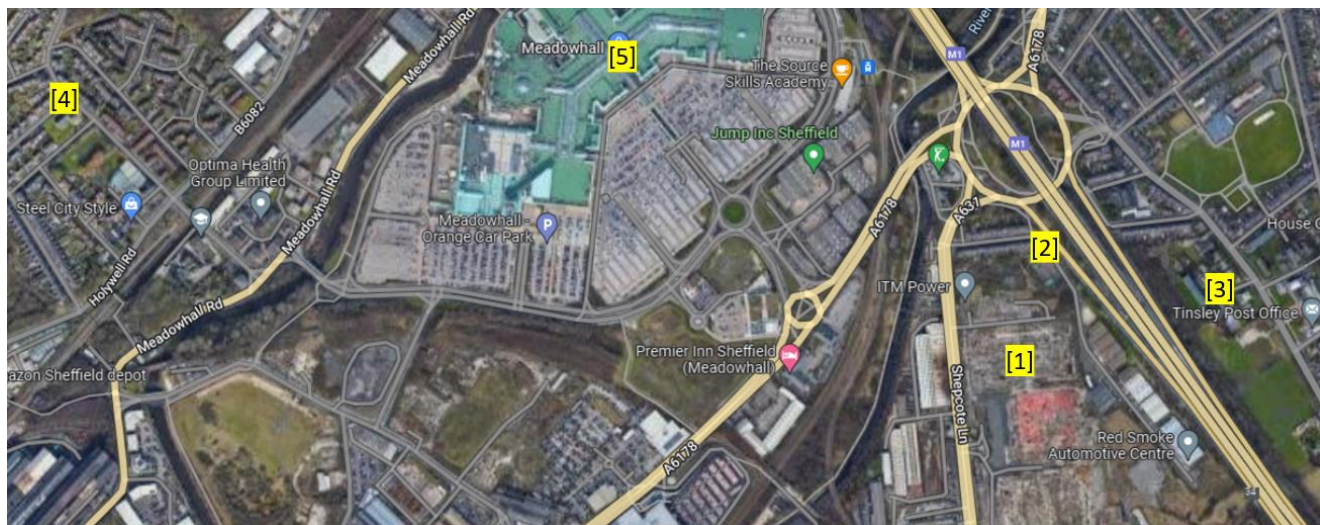
Location	L_{Aeq}	L_{Amax}	L_{A90}
Greasbro Road	54dB	66dB	48dB
Ingfield Avenue	55dB	66dB	51dB
Oxted Road / Jenkin Road	53dB	74dB	37dB

BS4142 Assessment

Results		Comments
Measured Ambient Sound Level - L_a (Totally encompassing Sound comprising the residual sound and the specific sound)	N/A	Specific sound not in operation during survey
Residual Sound Levels - L_r (Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T)	Daytime: 63dB Night-time: 54dB	Specific sound not active to determine the correction to be made to the measured ambient sound level
Background Sound Levels - $L_{A90,T}$ (A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T)	Daytime: 58dB Night-time: 48dB	Measured before the factory started up and deemed to be representative of the background sound when the plant is in operation.
Specific Sound Level - L_s (Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over the reference time interval, T)	N/A	Specific sound not in operation during survey
Acoustic Feature Correction (Correction for specific acoustic features that increase the significance of impact over the basic comparison between the specific sound level and the background sound level)	N/A	Specific sound not in operation during survey, therefore a subjective feature correction cannot be applied
Rating Level (Acoustic feature correction added to the Specific Sound Level)	N/A	Specific sound not in operation during survey, therefore a rating level cannot be established
Background Sound Levels - $L_{A90,T}$ (A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T)	Daytime: 58dB Night-time: 48dB	Measured before the factory was started up and deemed to be representative of the background sound when the plant is in operation.
Excess of Rating over Background Sound Level (Background Sound level subtracted from the Rating Level result)	N/A	
Assessment Result	N/A	A full BS4142 assessment will be conducted once the specific sound level has been established

8. Discussion

Description and Locations of Noise Sensitive Receptors



Map Point	Location
[1]	ITM Power
[2]	Greasbro Road Measurement Position
[3]	Ingfield Avenue Measurement Position
[4]	Oxted Road / Jenkin Road Measurement Position
[5]	Meadowhall Shopping Center

The residential properties at Greasbro Road are the closest noise sensitive receptor to ITM Power. The nearest noise source to these properties is the outlet of the purging process, which is located in the car park of ITM Power. Whilst a purge is being undertaken, air will be forced from these outlets; this process will only run for approximately 30 to 60 seconds, after which the remainder of the testing cycle will begin.

Sound from operations at ITM Power will, to a lesser degree, impact on properties at Ingfield Avenue and Jenkin Hill. The impact of sound on these properties will be lesser as these areas are a greater distance away from ITM Power; in addition to this, the M1 blocks the direct sound propagation path between ITM Power and Ingfield Avenue.

The intervening ground between ITM Power and Jenkin Hill, containing the Meadowhall Shopping Centre, is topographically lower than ITM Power and Jenkin Hill, meaning that sounds produced at ITM have a direct propagation path to residential properties on Jenkin Hill. The topography of the area also places Meadowhall in an acoustic shadow zone.

Appendix 1 – Monitoring Results

23/08/2022



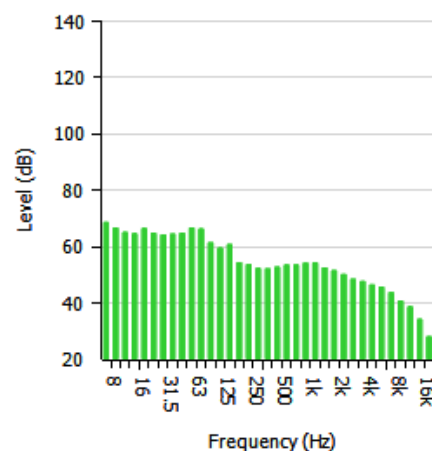
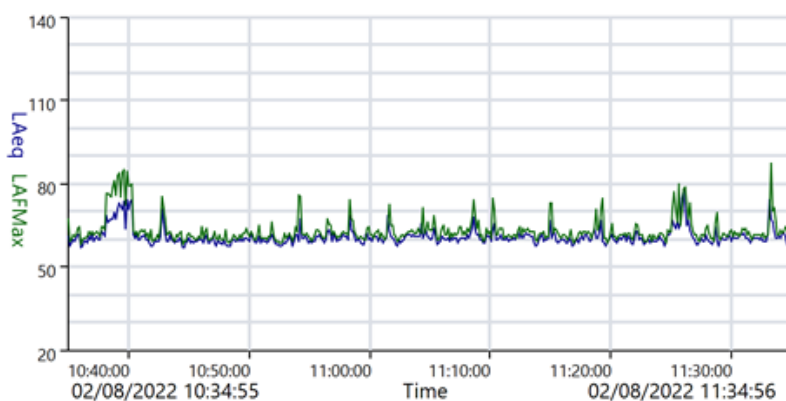
Measurement Summary Report

Name Greasbro Road, Day Survey
Time 02/08/2022 10:34:55 **Person** **Place** **Project**
Duration 01:00:00 ITM Power 17220
Instrument G301381, CR:171C

Calibration

Before 02/08/2022 10:27 **Offset** 0.08 dB **After** 02/08/2022 11:53 **Offset** 0.30 dB

Basic Values		Statistical Levels (Ln)	
LAeq	62.7 dB	LAF1	73.5 dB
LAE	98.3 dB	LAF5	65.4 dB
LAFMax	86.9 dB	LAF10	62.7 dB
		LAF50	59.9 dB
		LAF90	58.0 dB
		LAF95	57.6 dB
		LAF99	56.7 dB



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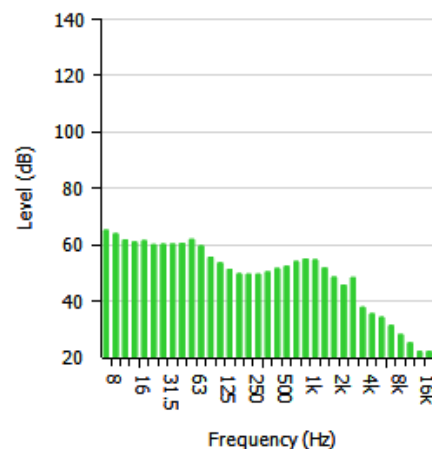
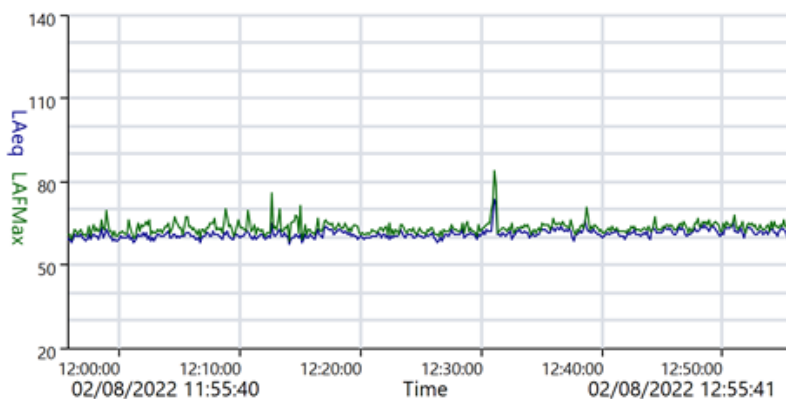
Measurement Summary Report

Name	Ingfield Avenue, Day Survey			
Time	02/08/2022 11:55:40	Person	Place	Project
Duration	01:00:00		ITM Power	17220
Instrument	G301381, CR:171C			

Calibration

Before	02/08/2022 11:53	Offset	0.30 dB	After	02/08/2022 13:21	Offset	0.53 dB
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Basic Values		Statistical Levels (Ln)	
L _{Aeq}	61.4 dB	LAF1	65.1 dB
L _{AE}	97.0 dB	LAF5	63.5 dB
L _{AFMax}	83.8 dB	LAF10	62.9 dB
		LAF50	60.7 dB
		LAF90	58.9 dB
		LAF95	58.4 dB
		LAF99	57.5 dB



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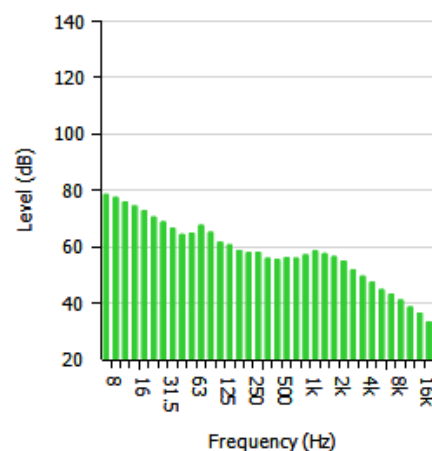
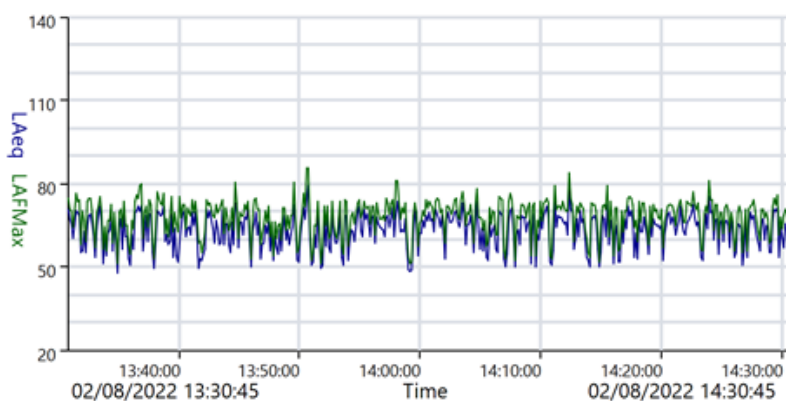
Measurement Summary Report

Name Oxted / Jenkin Road, Day Survey
Time 02/08/2022 13:30:45 **Person** **Place** **Project**
Duration 01:00:00 ITM Power 17220
Instrument G301381, CR:171C

Calibration

Before 02/08/2022 13:21 **Offset** 0.53 dB **After** 02/08/2022 14:34 **Offset** 0.56 dB

Basic Values		Statistical Levels (Ln)	
LAeq	66.3 dB	LAF1	74.8 dB
LAE	101.9 dB	LAF5	71.9 dB
LAFMax	85.7 dB	LAF10	70.4 dB
		LAF50	61.7 dB
		LAF90	51.5 dB
		LAF95	50.1 dB
		LAF99	47.5 dB



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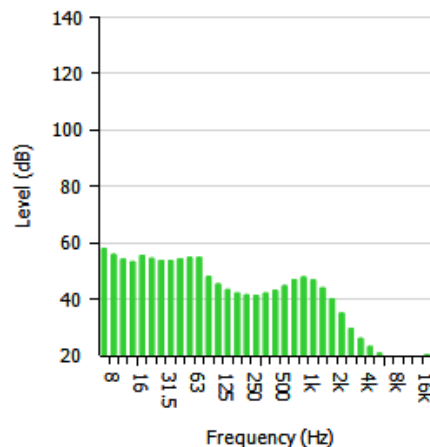
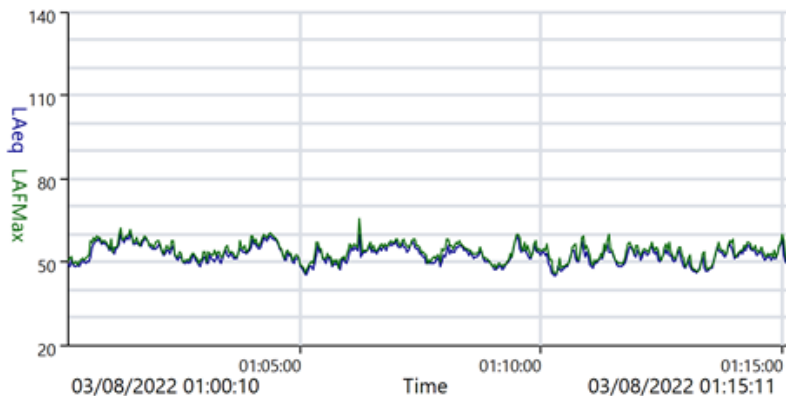
Measurement Summary Report

Name	Greasbro Road, Night Survey			
Time	03/08/2022 01:00:10	Person	Place	Project
Duration	00:15:00		ITM Power	17220
Instrument	G301381, CR:171C			

Calibration

Before	03/08/2022 00:55	Offset	0.22 dB	After	03/08/2022 02:07	Offset	0.26 dB
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Basic Values		Statistical Levels (Ln)	
LAeq	53.5 dB	LAF1	59.0 dB
LAE	83.0 dB	LAF5	57.4 dB
LAFMax	65.6 dB	LAF10	56.5 dB
		LAF50	52.4 dB
		LAF90	48.0 dB
		LAF95	47.1 dB
		LAF99	45.5 dB



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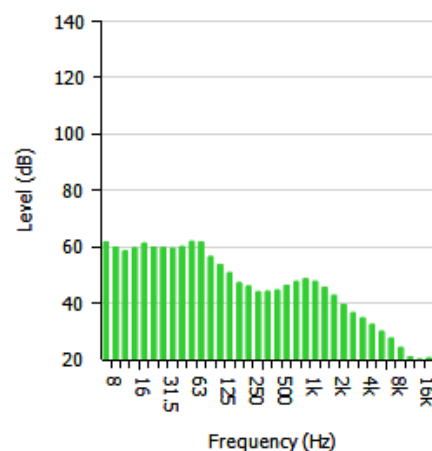
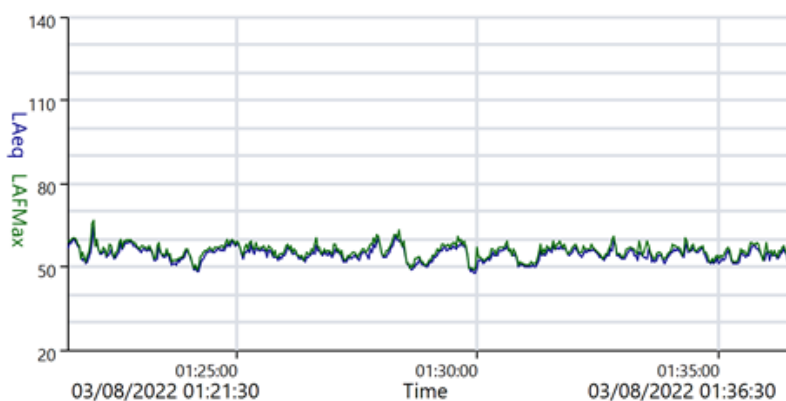
Measurement Summary Report

Name	Ingfield Avenue, Night Survey			
Time	03/08/2022 01:21:30	Person	Place	Project
Duration	00:15:00		ITM Power	17220
Instrument	G301381, CR:171C			

Calibration

Before	03/08/2022 00:55	Offset	0.22 dB	After	03/08/2022 02:07	Offset	0.26 dB
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Basic Values		Statistical Levels (Ln)	
LAeq	55.1 dB	LAF1	59.9 dB
LAE	84.6 dB	LAF5	58.4 dB
LAFMax	66.4 dB	LAF10	57.4 dB
		LAF50	54.5 dB
		LAF90	51.0 dB
		LAF95	50.1 dB
		LAF99	48.5 dB



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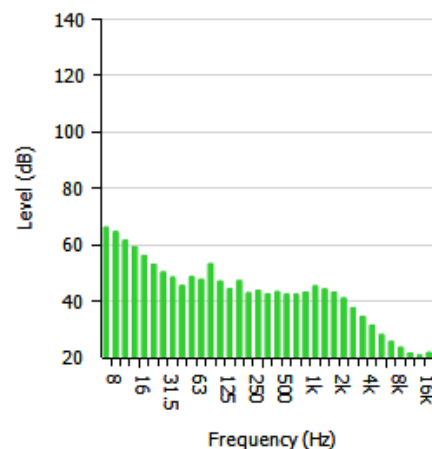
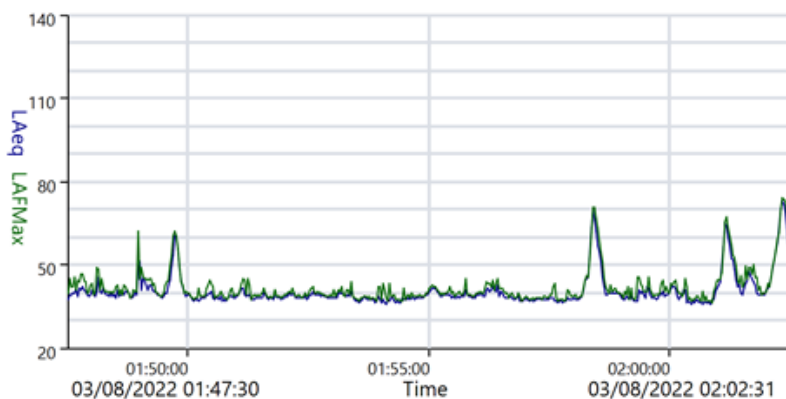
Measurement Summary Report

Name Oxted / Jenkin Road, Night Survey
Time 03/08/2022 01:47:30 **Person** **Place** **Project**
Duration 00:15:00 ITM Power 17220
Instrument G301381, CR:171C

Calibration

Before 03/08/2022 00:55 **Offset** 0.22 dB **After** 03/08/2022 02:07 **Offset** 0.26 dB

Basic Values		Statistical Levels (Ln)	
LAeq	52.8 dB	LAF1	67.6 dB
LAE	82.3 dB	LAF5	53.7 dB
LAFMax	74.2 dB	LAF10	44.2 dB
		LAF50	38.5 dB
		LAF90	36.8 dB
		LAF95	36.4 dB
		LAF99	35.8 dB



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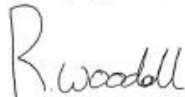
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Appendix 2 – Calibration Certificates

CERTIFICATE OF CALIBRATION		
ISSUED BY	Cirrus Research plc	
DATE OF ISSUE	07 July 2021	CERTIFICATE NUMBER 159595



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

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Approved signatory R. Woodall Electronically signed: 

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Cirrus Research plc	Notes:
Model:	CR:171C	
Serial number:	G301381	
Class:	1	
Firmware version:	5.6.3177	

Test summary

Date of calibration: 07 July 2021

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:
159595

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Environmental conditions

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

Before	Pressure: 99.92 kPa	Temperature: 22.3 °C	Humidity: 55.6 %
After	Pressure: 99.96 kPa	Temperature: 22.5 °C	Humidity: 56.9 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	TTi	TG4001	350657
Attenuator	Cirrus Research	ZE:952	78135
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: 10173F

Microphone

Model: MK:224
 Serial number: 212697A


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	07/07/21	CERTIFICATE NUMBER 159591



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

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Test engineer: B. Wigmore Electronically signed: 

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc

Model: MK:224

Serial Number: 212697A

Calibration procedure

Date of calibration: 01 July 2021

Open circuit: 37.5 mV/Pa

Sensitivity at 1 kHz: -28.5 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: 101.06 kPa

Temperature: 22.0 °C

Humidity: 45.5 %

CERTIFICATE OF CALIBRATION

Certificate Number: 159588
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Environmental conditions

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

Pressure: 99.82 kPa
 Temperature: 20.9 °C
 Humidity: 59.5 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Acoustic Calibrator	Bruel and Kjaer	4231	2229486
Distortion Meter	Keithley	2015	0761605
Multimeter	Fluke	8845A	1293007

Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Acceptance limit	Uncertainty
Level (dB)	94.00	94.02	93.98	93.98	93.99	-0.01	±0.40	0.11 dB
Distortion (%)	< 3.00	0.22	0.21	0.17	0.20	0.20	+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

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**
DATE OF ISSUE **07 July 2021** CERTIFICATE NUMBER **159588**



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

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Approved signatory
R. Woodall
Electronically signed:

Sound Calibrator : IEC 60942:2017

Instrument information

Manufacturer: Cirrus Research plc **Notes:**
Model: CR:515
Serial number: 69420
Class: 1

Test summary

Date of calibration: 07 July 2021

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_2017 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_2017 Annex A to Class 1. This has been confirmed with the Physikalisch-Technische Bundesanstalt (PTB), Laboratoire National d'Essais (LNE) and 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%.

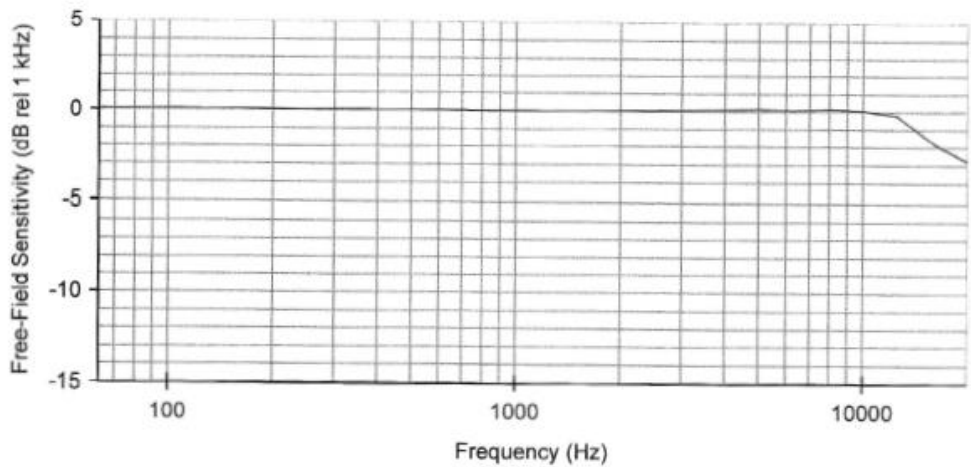
CERTIFICATE OF CALIBRATION

Certificate Number: 159591
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Free-Field Frequency Response : Tabular

Frequency (Hz)	Free-Field Sensitivity (dB rel 1 kHz)	Actuator Response (dB)
63	0.07	-0.14
80	0.06	-0.05
100	0.07	0.02
125	0.04	0.04
160	0.05	0.06
200	0.03	0.07
250	0.01	0.06
315	0.04	0.07
400	0.02	0.06
500	0.03	0.06
630	0.02	0.05
800	0.01	0.04
1 000	0.00	0.02
1 250	-0.01	-0.01
1 600	0.01	-0.06
2 000	0.03	-0.13
2 500	0.04	-0.23
3 150	0.05	-0.42
4 000	0.08	-0.70
5 000	0.14	-1.07
6 300	0.07	-1.85
8 000	0.15	-2.89
10 000	0.05	-4.62
12 500	-0.22	-6.68
16 000	-1.81	-9.72
20 000	-2.79	-11.80

Free-Field Frequency Response : Graphical



Appendix 3 – Certificates of Competency



Certificate of Membership

This is to certify that

Mr Aidan Willis

has been elected as a

Student Member

of the
Institute of Acoustics

*Given under the seal of the Institute
in accordance with the
Articles of Association and By-Laws*

President

A handwritten signature in black ink, appearing to read "Stephen Turner".

Institute Secretary

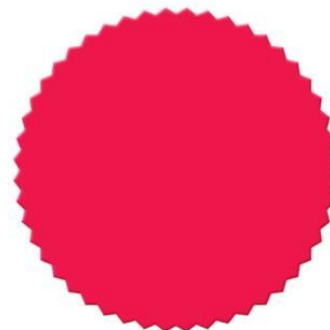
A handwritten signature in black ink, appearing to be a cursive name.

Valid Until

01-10-2022

Membership Number

0



The certificate remains the property of the Institute and shall be returned to the Institute on demand.
Membership of the Institute is subject to annual renewal

The Institute of Acoustics Limited, 3rd Floor, St Peter's House, 45-49 Victoria Street, St Albans, Hertfordshire AL1 3WZ
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Faculty of
Occupational
Hygiene



Through her knowledge of the broad principles of Occupational Hygiene and
her education, training and professional experience

Helen Woollaston

is competent to practise in the comprehensive field
and is duly awarded the

***Certificate of
Operational Competence
in
Occupational Hygiene***

A handwritten signature in black ink, appearing to read 'LAM', is written over a faint, large watermark of the BOHS logo.

**Leonard Morris
Chief Examiner**



**September 2019
Certificate No. 260919/002**

BOHS, 5/6 Melbourne Business Court, Millennium Way, Pride Park, Derby, DE24 8LZ, UK
BOHS Incorporated by Royal Charter No. RC000858 Registered Charity No. 1150455

End of Report