Acoustic Assessment of Plant Noise at

Purple Patch

14 Rosebery Avenue

London

Document Ref: 071516 Rev A

Date: 20/07/2015

Executive Summary

Ned Johnson Acoustic Consultants Limited has been appointed by Purple Patch to undertake an acoustic assessment of the noise from a condenser unit located at the rear of 14 Rosebery Avenue, London, EC1R 4TD .

The assessment takes account of the existing noise environment which has been quantified using direct measurement.

The results of the survey show that the noise from the condenser unit is unlikely to give rise to noise complaints to local residents.

Contents

Executive Summary **2**

1. Introduction **4**

2. Site Description **5**

3. Planning Reference Documents **6**

4. Survey Methodology **12**

5. Noise Survey Results **14**

6. Evaluation of Results **17**

Appendix 1 ..... **18**

Appendix 2 ..... **20**

Appendix 3 ..... **21**

1. Introduction

1.1 Ned Johnson Acoustic Consultants Limited has been appointed by Purple Patch to undertake an acoustic assessment of the noise from a condenser unit located at the rear of 14 Rosebery Avenue, London, EC1R 4TD .

1.2 The development involves the installation of a condenser unit to provide air conditioning for the office building under renovation.

1.3 The condenser unit is a Mitsubishi PUMY-P112VKM and it is already in place on the outside wall at the rear of the building. The unit is located with no line of site to the residential properties on the floor above which are set back and have a walkway between them and the wall containing the condenser unit.

1.4 The survey follows the method set out in BS4142: 2014 Methods for rating and assessing industrial and commercial sound.

1.5 The location for the rating has been chosen as the facade of the nearest residential building in relation to the generator.

1.6 The acoustic terminology used in this report has been set-out and explained in Appendix 1.

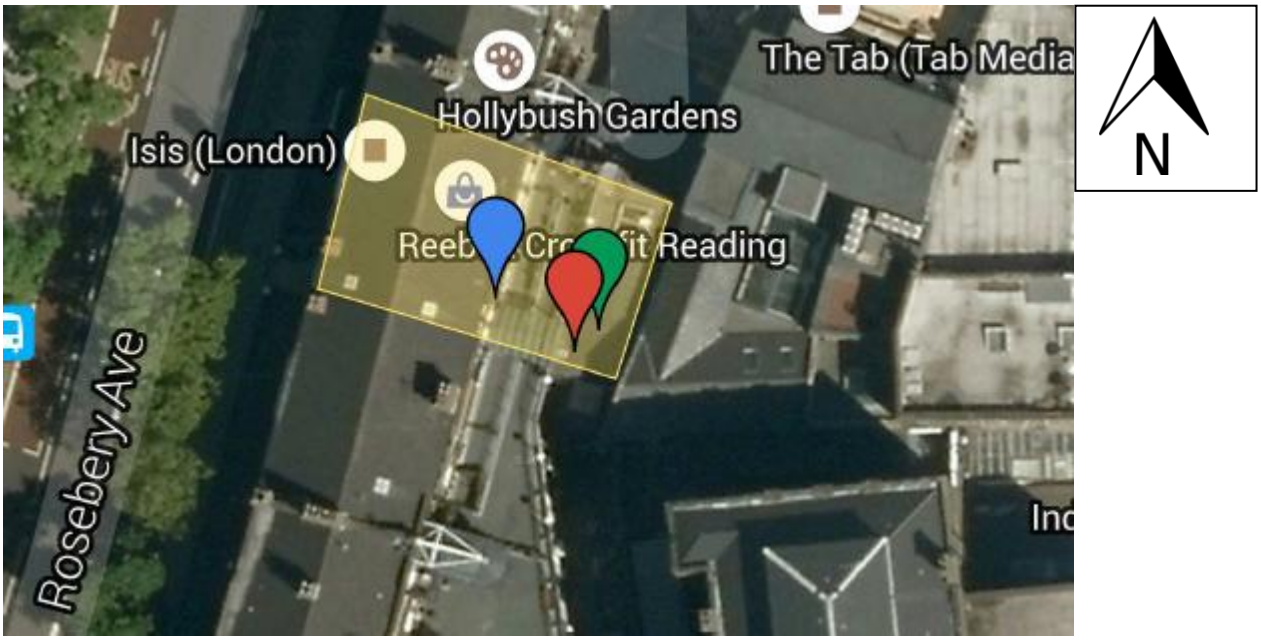
2. Site Description

2.1 The condenser unit is situated at the rear of 14 Rosebery Avenue, London, EC1R 4TD.

2.2 Figure 1 below shows the location of Purple Patch. The measurement point is marked by the green pin.

2.3 The nearest residential property is 5 meters from the condenser units (blue pin). The location of the condenser unit is shown in Figure 1 below by the red pin.

Figure 1.



3. Reference Documents

National Planning Policy Framework

3.1 The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including PPG24, which until the emergence of the NPPF, set out the Government's position on how noise should be dealt with in the planning system.

3.2 The guidance set out in PPG24 has been replaced in the NPPF by four aims, which are set out at paragraph 123 in Section 11 of the document, titled *Conserving and enhancing the natural environment*:

"Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development ;*

- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*

- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*

- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

3.3 There are two footnotes to the above guidance. The first footnote refers to the Explanatory Note of the *Noise Policy Statement for England*, which defines both "*significant adverse impacts on health and quality of life"* and *"adverse impacts on health and quality of life"* as described in the first two bullet points.

3.4 The second footnote indicates that the third bullet point is *"subject to the provisions of the Environmental Protection Act 1990 and other relevant law"*.

3.5 Annex 1 of the NPPF, titled *Implementation* notes that:

"210 Planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise.

211 For the purposes of decision-taking, the policies in the Local Plan (and the London Plan) should not be considered out-of-date simply because they were adopted prior to the publication of this Framework.

212 However, the policies contained in this Framework are material considerations which local planning authorities should take into account from the day of its publication. The Framework must also be taken into account in the preparation of plans.

213 Plans may, therefore, need to be revised to take into account the policies in this Framework. This should be progressed as quickly as possible, either through a partial review or by preparing a new plan.

214 For 12 months from the day of publication, decision-takers may continue to give full weight to relevant policies adopted since 2004 even if there is a limited degree of conflict with this Framework.

215 In other cases and following this 12-month period, due weight should be given to relevant policies in existing plans according to their degree of consistency with this framework (the closer the policies in the plan to the policies in the Framework, the greater the weight that may be given)."

Noise Policy Statement for England

3.6 The Department for Environment, Food and Rural Affairs published the *Noise Policy Statement for England* (NPSE) in March 2010. The explanatory note of NPSE defines the terms used in the NPPF:

"2.20 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur."

3.7 The NPSE does not define the SOAEL numerically, stating at paragraph 2.22:

"2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

3.8 There is no local or national guidance on how the three terms should be defined numerically.

3.9 There are three aims in the NPSE, which match, and expand upon, the first two bullet points in paragraph 123 of the NPPF and add a third aim that relates to a wider improvement in health and quality of life (the bold text is in the NPSE):

3.10 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.

3.11 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

3.12 This aim seeks, where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

London Plan

3.13 The London Plan, titled *Spatial Development Strategy for Greater London* (July 2011)provides the policy context for managing noise through the regional planning process. Part B of Policy 7.15 *Reducing Noise and Enhancing Sound Scapes* is relevant to the current proposals. It states:

"Development proposals should seek to reduce noise by:

a) minimising the existing and potential adverse impacts of noise on, from, within, or in the vicinity of, development proposals

b)separating new noise sensitive development from major noise sources wherever practicable through the use of distance, screening, or internal layout in preference to sole reliance on sound insulation

c)promoting new technologies and improved practices to reduce noise at source."

London Plan Supplementary Planning Guidance

3.14 The May 2006 London Plan Supplementary Planning Guidance (SPG) *Sustainable Design and Construction* is referenced in the Draft DMD. The SPG sets out what can be done within the current policy framework *"to design and construct new developments in ways that contribute to sustainable development"*.

3.15 Section 2.4 *Reduce the impacts of noise, pollution, flooding and microclimatic effects* contains Section 2.4.2 *Noise*. This sets out two aspirational development standards:

"Essential Standard:

Demonstrate that adverse impacts of noise have been minimised, using measures at source or between source and receptor (including choice and location of plant or method, layout, screening and sound absorption) in preference to sound insulation at the receptor, wherever practicable.

Mayor's Preferred Standard:

For residential development, achieve BS 8233:1999 (Table 5) 'good' standards for external to internal noise and improve on Building Regulations (2003) Part E for internal sound transmission standards by 5dB (See BRE Ecohomes)."

British Standard 4142

3.16 The scope of British Standard 4142: *Method for rating industrial noise affecting mixed residential and industrial areas* describes methods for determining, at the outside of a building:

a) noise levels from factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises; and

b) background noise level.

Environmental Protection Act 1990

3.17 The law relating to the control of noise in the vast majority of cases is covered by the statutory nuisance provisions of the Environmental Protection Act 1990. The provisions are under Section 79 of Part III of the Act.

3.18 Section 79 (1)(g) is the paragraph relating to noise which states that where a local authority witnesses a nuisance it shall serve notice.

3.19 Section 80 gives the legislative basis for abatement notices which are used to prevent the nuisance occurring or recurring. The breach of the terms of an abatement notice is an offence which can be prosecuted in a Magistrates Court.

3.20 There are several defences for the breach of an abatement notice the relevant one to business premises is that of best practical means.

4. Survey Methodology

4.1 The night time survey was conducted for 24-hours on July 16th - 17th between the hours of 13:24 - 13:24.

4.2 The instrument used for the survey was a Bruel & Kjaer 2260 precision grade Sound Level Meter, which meets the requirements of BS EN 61672: 2003.

4.3 The sound level meter was calibrated immediately before and after use with a Bruel & Kjaer 4231 Acoustic Calibrator and no drift was noted in calibration readings. The calibration certificates for the instruments are shown in Appendix 2. The calibrator generates 94dB$_A$ at 1000Hz and the calibration result was 93.9dB$_A$ before and after the measurements.

4.4 The measurements were taken with the sound level meter in accordance with the requirements of BS4142:2014. The sound level meter was 1.5 metres above the ground and there were no reflective surfaces other than the ground within 3.5 metres.

4.5 The location for the measurements was representative of the receptor location for background and ambient noise.

4.6 The background was measured without the specific noise source which is not yet operational.

4.7 For the above reason the rating of the plant has been made by calculation, which is a method recommended in paragraph 7.3.5 of BS4142 where the calculation is allowed due to the lack of the specific noise source. Other than this the standard methods for calculating the rating in BS4142: 2014 have been used.

4.8 The equation used for calculating attenuation with distance is:

- $L_P = L_w + 10\log (2/4\pi r^2)$

4.9 The weather during the measurements at ranged between 25^{o}C - 18^{o}C with a wind speed of 0.5 metres/second. There was no precipitation and the cloud cover was approximately 30%.

4.10 During the survey there were no unusual or noticeable noise events.

5. Noise Survey Results

5.1 During the survey the dominant source of noise was road traffic.

5.2 Table 1. below shows the results of the lowest measured background taken during the survey shown as a $L_{A90\ 15\text{-minute}}$.

Table 1.Summary of measured noise levels.

Period	Duration	L_{A90}
Daytime	22:30 - 22:45	45
Night Time	03:45 - 04:00	41

5.3 The results of the background survey show that the noise from the plant must have a rating of 35dB$_A$ at the receptor point during the day and 31dB$_A$ during the night to have no impact upon the existing background noise level.

5.4 The following tables present the assessment calculations and results:

Table 2. Daytime Results

Results	Measurement	Clause	Commentary
Ambient sound level	$L_{Aeq\ 15\ minute}$ = 50	7.3.1	
Residual sound	N/A	7.3.3	No variation detected from ambient so specific noise level to be calculated
Lowest background sound level	L_{A90} = 45	8.3	
Specific sound level at 1 metre according to manufacturer's data	49dB_A		
Attenuation with distance to measurement point at 5 metres	-14dB		
Acoustic feature	+6dB	9.2	+2 dB added for tonal content and +4 dB added intermittent sound
Reduction due to wall screening	-10dB		
Rating level	49 + 6 - 10 - 14 = 31dB_A	11	Sound source plus acoustic features minus distance and wall.
Lowest background sound level	L_{A90} = 45	8.3	
Rating level below background at receptor point	-14dB_A	11	
The assessment shows that there is likely to be an adverse impact at receptor point			
Uncertainty of the assessment			The measurements were taken in repeatable conditions so the uncertainty rating will be low

Table 3. Night Time Results

Results	Measurement	Clause	Commentary
Ambient sound level	$L_{Aeq\ 15\ minute}$ = 43	7.3.1	
Residual sound	N/A	7.3.3	No variation detected from ambient so specific noise level to be calculated
Lowest background sound level	L_{A90} = 41	8.3	
Specific sound level at 1 metre according to manufacturer's data	49dB_A		
Attenuation with distance to measurement point at 5 metres	-14dB		
Acoustic feature	+6dB	9.2	+2 dB added for tonal content and +4 dB added intermittent sound
Reduction due to wall screening	-10dB		
Rating level	49 + 6 - 10 - 14 = 31dB_A	11	Sound source plus acoustic features minus distance and wall.
Lowest background sound level	L_{A90} = 41	8.3	
Rating level below background at receptor point	-10dB_A	11	
The assessment shows that there is likely to be an adverse impact at receptor point			
Uncertainty of the assessment			The measurements were taken in repeatable conditions so the uncertainty rating will be low

6 Evaluation of results

6.1 The suitability of the development has been determined by comparing the measured noise levels with the criteria set out in Section 3 of this report.

6.2 The results show that for the daytime the rating level will be -14dB; in other words 14dB below the background level. Likewise the night-time result is -10dB. Both results show that the noise from the condenser unit will be 10dB or more below the lowest measured background noise level during operational hours. This means that the units will be inaudible at the nearest residential properties and have no impact.

6.3 In terms of the Noise Policy Statement for England the unit can be rated as NOAEL and therefore acceptable in planning terms as there will be no loss of amenity for residents due to the operation of the condenser unit.

Appendix 1: Glossary of Terms

Daytime Defined in PPG 24 as the period 07:00-23:00 hours.

Night-time Defined in PPG 24 as the period 23:00-07:00 hours.

Decibel (dB): A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure levels the reference quantity is 20 uPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB(A), Lax: Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).

LA10,T: The A weighted noise level exceeded for 10% of the measurement period, T. It gives an indication of the upper limit of fluctuating noise such as that from road traffic. LA10,18h is the arithmetic average of the 18 hourly LA10,1h values from 06:00-24:00.

LA90,T: The A weighted noise level exceeded for 90% of the measurement period, T. This is defined in BS 4142 as the background noise level.

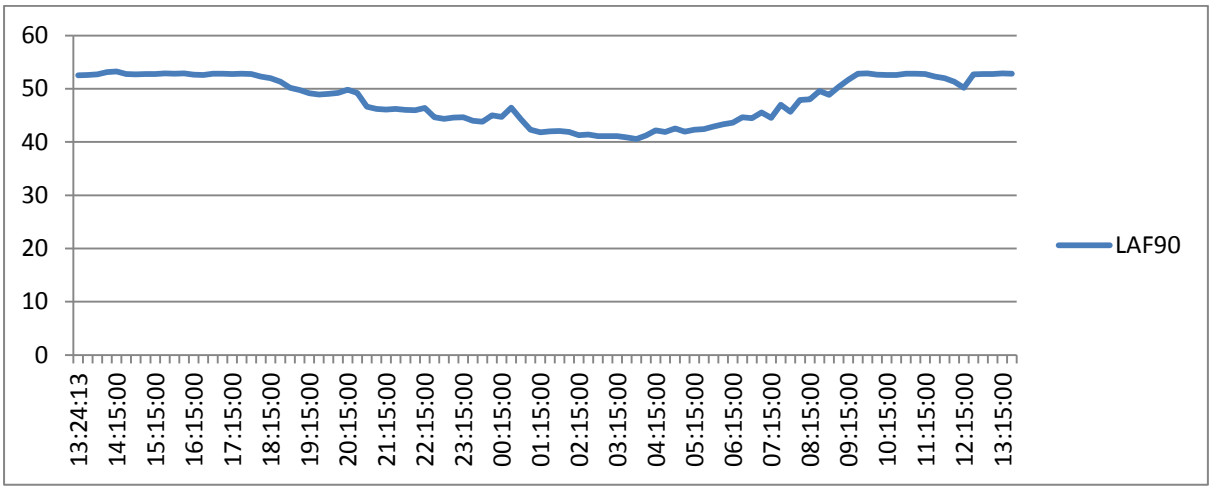
LAE: The sound exposure level – the level of a sound with a period of 1 second that has the same sound energy as the event considered.

LAeq,T: The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a

specified measurement period (T). LAeq, T is used to describe many noises and can be measured directly with an integrating sound level meter.

LAmax: The highest A weighted noise level recorded during a noise event. The time weighting (slow or fast) should be stated.

Appendix 2: Survey Results



Appendix 3: Calibration Certificates

ATP Instrumentation Ltd
Tournament Way, Ivanhoe Industrial Estate
Ashby-de-la-Zouch, Leicestershire, UK. LE65 2UU
Tel: 01530 566800
Fax: 01530 560373
E-mail: sales@atp-instruments.co.uk
Web: www.atp-instrumentation.co.uk

Page 1 of 3 Pages

Certificate of Calibration

Certificate Number: 56468

Date of Calibration: 13.07.2015

Customer: NED JOHNSON ACOUSTIC CONSULTANTS LTD

Instrument Under Test: TYPE 2260 **Instrument Serial Number:** 2034414

Test Equipment Used: CRL-511E Acoustic Calibrator

Test Equipment Serial Number: 21128

The above test equipment is certified to 'traceable' standards.

Lab Environmental conditions at time of calibration: Temp 21.1°C±1°C / RH 50% RH ±5% Pressure 1025 hPa

True Reading (dB)		Instrument Measured Value (dB)	Error (dB)	Uncertainty of Measurement (±dB)
Low Range				
94	"A" Slow	93.4	-0.6	±0.21dB +D
94	"A" Fast	93.3	-0.7	±0.21dB +D
94	"C" Slow	93.4	-0.6	±0.21dB +D
94	"C" Fast	93.3	-0.7	±0.21dB +D
High Range				
Input	**Frequency**			
94	"A" Slow	93.4	-0.6	±0.21dB +D
94	"A" Fast	93.4	-0.6	±0.21dB +D
94	"C" Slow	93.4	-0.6	±0.21dB +D
94	"C" Fast	93.4	-0.6	±0.21dB +D
104	"A" Slow	103.4	-0.6	±0.21dB +D
104	"A" Fast	103.4	-0.6	±0.21dB +D
104	"C" Slow	103.4	-0.6	±0.21dB +D
104	"C" Fast	103.4	-0.6	±0.21dB +D

D = The resolution of the Instrument being calibrated
Tests carried out at a frequency of 1KHz ±8Hz
Uncertainty coefficient K=2, i.e. a 95% confidence level

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Certificate No. 56468

Atmospheric Barometric Pressure Correction

Variations in atmospheric pressure both at altitude and at sea level can affect the measured values of sound level meters.

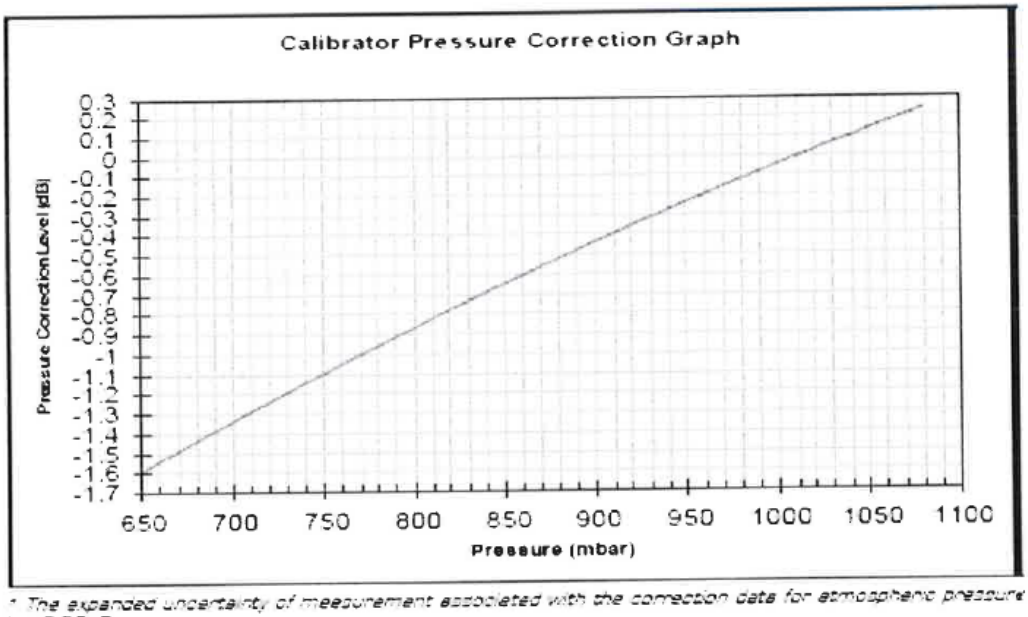
The graph below highlights the correction factor to be applied when

Using Class 1 accuracy equipment depending on the atmospheric pressure at the time of use.

The same factor can also be applied when using Class 2 accuracy equipment although this is optional.

Should you require any further information or clarification please contact ATP's Technical Support Department.

Direct line: 01530 566804



1 The expanded uncertainty of measurement associated with the correction data for atmospheric pressure is ±0.03dB

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Certificate No. 56468

Qualification of Standard Used

This is to certify that the stated instrument has been verified and calibrated at the measured values given in the results table on page 1 of this 2 page document using test equipment which itself has been calibrated and certified to the stated standard. Calibration of the stated instrument was carried out on the date of issue of this certificate. The procedures and work instructions used to verify and calibrate the instrument are fully documented.

The errors reported refer to measured values only with no account being taken of the instrument's ability to maintain its calibration.

Details of this instrument, certification and supply have been entered onto our database. A re-calibration recall notice will be issued two weeks prior to 12 months from the date of supply. Should you require a recall notice to be issued on a different time scale, to accommodate for example a 6 monthly calibration, please send a written statement to the Repair and Calibration Laboratory to re-schedule the issue of the recall notice.

Signed:

Authorised Signatory:
G Clarkson K Ross E Tombs E Jordan

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Certificate of Calibration

Certificate Number: 56469

Date of Calibration: 13.07.2015

Customer: NED JOHNSON ACOUSTIC CONSULTANTS LTD

Instrument Under Test: TYPE 4231 **Instrument Serial Number:** 1790629

Test Equipment Used: CRL-511E **Test Equipment Serial Number:** 021128

The above test equipment is certified to 'traceable' standards.

Lab Environmental conditions at time of calibration: Temp 21.1°C±1°C/ RH 50% RH ±5%

True Reading (dB)	Instrument Measured Value (dB)	Error (dB)	Uncertainty of Measurement (±dB)
94	96.1	2.1	±0.21dB

Uncertainty coefficient K=2, i.e. a 95% confidence level

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Page 2 of 2 Pages
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Signed:

Authorised Signatory: G Clarkson K Ross E Tombs E Jordan