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REPORT No: 178 **Date:** 3rd August 2021

CLIENT PROJECT REFERENCE:

374 Brighton Road,
Shoreham, Brighton
BN43 6RE

PRE – COMPLETION ACOUSTIC TESTING
Sound Insulation Survey

PREPARED FOR:

374 Brighton Road,
Shoreham, Brighton
BN43 6RE

PREPARED BY:

Jesus Rafael
Technical Assistant

Salih K. Hassan
Senior Acoustic Consultant
BSc, BEng (Hons), MSc,MIOA, MIEE, LDip, MSLL, MTCEA, MCIBSE, CEng.

IOA Registration No. 30878
IEE Registration No. 16695640
MCIBSE No 5628
Engineering Council No. 510932

Signed: *Salih K. Hassan* **Date:** 5th August 2021

374 Brighton Road, Shoreham Brighton, BN43 6RE

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1.0: INTRODUCTION

In request for a sound insulation test instructed by Building Control Manager, Bektas Uzun from ADA Group appointed S.K.H Associates Ltd. to carry out a sound insulation test between the property at 374 Brighton Road, Shoreham, Brighton BN43 6RE. The sound insulation test was carried out on the 3rd of August 2021 at 10:00 am.

The aim and purpose of the sound insulation tests are to examine and investigate whether the walls of the premises meets the respective values set by the Building Regulation Approved Document E.

The completion tests are required by the Building Control Authority in accordance with the requirements of the Building regulations 2000 as defined in Approved Document E (2003 edition amended 2004).

This report contains the test results and analysis of the airborne and impact sound insulation of the floor and wall constructions as requested by Building Control Manager.



F**ig. 1**: The front view to the Property at 374 Brighton Road, Shoreham, BN43 6RE



F**ig. 2:** The rear view at the property at 374 Brighton Road, Shoreham BN43 6RE.

2.0: THE CONSULTANT

The Consultant Mr. S. Hassan (BSc, BEng (Hons), MSc, LDip, MIOA, MTCEA, MIEE, MCIBSE, CEng), who attended the site and performed the tests has many years experience in Acoustics and have performed similar building tests over 35 years for various local authorities, property developers, Law Centres, housing associations and private clients.

Mr. Hassan has been working at London South Bank University over 30 years. He has been teaching Building Acoustics to the undergraduate and postgraduate students, he has been undertaking consultancy work and involved in many research projects.

Recently Mr. Hassan has been involved with Wind Turbine project for Southward Council, Haringay council and Islington Council. Monitoring the noise, vibration and wind velocity produced by the turbine.

Over the years Mr. Hassan have worked on:

- Planning proposals and applications
- Surveys for traffic and industrial noise
- Testing fan coil units and grills
- Shock and vibration measurements
- Sound insulation measurements

Some of the projects and organizations for which environmental works have been carried out directly and indirectly by Mr. Hassan are as follows:

- BOC
- National grid
- Guy's Hospital
- Gilbert grill manufacturers
- Channel tunnel project
- Home office
- Hammersmith Council
- Thermal Systems Product Ltd.
- ACE Build UK Ltd
- A.R.D. Engineering Ltd
- Broadway theatre
- Croydon Churches Housing Association
- Blitzgold and Association
- London Property Development Company
- Cream Properties Ltd
- Vision Homes Ltd
- Pickhurst Homes Ltd.
- Pyramid Properties Ltd.

Finally some of the Local Authorities for which sound survey and sound insulation test reports were prepared and presented were as follows:

Enfield, Lambert, Newham, Tower Hamlets, Haringey , Hammersmith, Hackney, Edmonton, Hestings, Sothwark, Croydon, Lewisham, York, Camden, Chatham, Islington, Brighton, Newham, Porthmouth, Dulwich, Wickford, Westminster.and NHBC, Tunbridge Wells, Grantham, Bath, London Building Control.

3.0: DESCRIPTION OF SITE LOCATION

The property under observation was located at 374 Brighton Road, Shoreham, Brighton BN43 6RE. The property was two floors and located on a busy road as shoved on fig. 1. The first floor of the property was recently converted into a separate flat and the ground floor of the property was an open plan shop. The first floor was consists of a one bedroom, a kitchen/dining room and a bathroom.
Access to flat was from the rear of the property via a set of staircase as shown in fig. 2. Access to the shop was from the LHS of the property.
We were asked to measure the airborne and impact sound insulation between the first floor flat and the shop to see whether it meets the respective values set by the Building Regulation Approved Document E.
The first floor of the property was fully furnished and the floor of the tested room was carpeted.
All the windows of the property were double glazed and had separate central heating systems.

The approximate dimensions of the tested rooms:

Test	Item room	Length (m)	Width (m)	Height (m)	Floor area (m^2)	Volume (m^3)
1	G/F Open plan Shop	9.5	4.8	5.5	45.6	114.0
2	1/F Flat - Lounge	4.8	4.9	2.4	23.5	56.5
3	Shop Total Floor Area	12.6	4.8	-	60.5	-
4	Flat Total Floor area	16.0	4.8	-	76.8	-

4.0: EQUIPMENT USED

Norsonic Precision Sound Analyzer, Nor. 140. Serial No: 1402815
Norsonic Tapping Machine Nor. 277.
B&K precision calibrator type 4224: At 1 KHz, level 94dB
Norsonic Power Amplifier with Hemisphere load speaker.

Norsonic Precision Sound Analyzer Nor. 140 was capable of measuring, recording, and averaging sound pressure levels and reverberation times at various number of microphone positions. It is able to connect to a printer where the end-user could print-off the airborne and impact sound insulation data on site. Alternatively, the device is able to store the data in its memory and the user can later connect the device to a computer for further analysis and comparison offsite.

The gain of the Norsonic Precision Sound Analyzer Nor. 140 was adjusted to give a reading of 94dB at 1 KHz using B&K precision calibrator type 4224. The equipment was calibrated prior to and after measurements took place.

5.0: THE TEST PROCEDURE

The equipment and the microphones were calibrated prior to and after measurements were carried out.
The floor was marked for the five microphone and loud speakers positions. These were at least 1m away from any reflecting surfaces.
The airborne test is performed first using the loud speaker as a sound source.
Two rooms are selected one to be used as a source room and the other to be used as a receiving room.
The equipment is set up to measure the reverberation time in the receiving room.
The equipment is then set up to measure the sound pressure level in the receiving room and source room.
Five measurements are made in each case and the average taken.
The equipment produces graphical output.
The impact test is then begun.
The equipment is set up again with the tapping machine instead of the speaker unit.
Five measurements in the receiving room are made in each case and average taken.
All the DnT,w and LnT,w results were printed out in graphical and tabular forms.

6.0: WHAT THE RESULTS MEAN

Sound insulation is a function of the frequency of the sound; this means that most of the regulations that specify sound insulation between dwellings require a comparison of the results of the measurements taken with some form of reference curves the frequencies from 100 to 3150 Hz.
Also with all sound criteria it has always been the practical to reduce all the sound levels at all the frequencies within the range of measurements to one simple number.
When dealing with sound insulation this number, is sometimes called a “Single Figure Indices”.
The method of achieving this trick is contained in ISO 717-1982 where they obtain two numbers. The first of these numbers is for airborne sound and the second is for impact sound.
These are the two separate tests discussed previously to carry out these tests is contained in a document called ISO 140
The airborne test uses sound produced from a loud speaker as stated before.
The impact test uses sound produced by a tapping machine. (Its best described as an expensive tap dancing box.)
The number is found by taking a reference curve and moving this 1 dB at a time over a curve produced from the measurement data until the conditions* in the IOS standard are achieved. Then the “Weighted Apparent Sound Reduction Index, "Rw” is defined as the value of the shifted reference curve at a frequency of 500 Hz.
The impact sound single number is named, “Weighted Normalized Impact Sound Pressure Level Ln.w”. (Referred to as LnT,w by the equipment output.)
This number is found in a similar way using a different reference curve.
The condition is as follows:
The mean favorable deviation should be as large as possible but not greater than 2 dB.
The maximum unfavorable deviation must be recorded if it exceeded 8 dB at any frequency.

7.0: WHAT TO DO NEXT

There are limits contained in the building regulations 1991 in the approved document "E" refers to the passage of sound.

In Section 6.8, deals with tests for insulations of floors between dwellings, quoted the following as acceptable limits;

Airborne Sound Insulation

The values achieved by the floors with any remedial measures should be NOT LESS than DnT,w = 48dB.

Impact Sound Transmission

The value achieved by the floors with any remedial measures should be NOT MORE than LnT,w = 65 dB.

The Robust Standard Details (RSD) scheme requirements are as follows:

NOT LESS THAN DnT,w + Ctr = 43 for walls and floors

NOT GREATER than LnT,w = 62 dB

Ctr is the Spectrum Adaptation Term. Ctr is a correction factor depending on Reverberation Time (RT) and Background Noise Level, which are different for every test.

8.0: Building Regulations Table 1a, E1

Table 1: Building regulation Table 1a, E1.		
Dwelling-houses and flats – performance standards for separating walls, separating floors, and stairs that have a separating function		
	Airborne Sound Insulation $DnT,w+C_{tr}$dB (min. value)	Impact Sound Insulation LnT,w dB (max. value)
Purpose build dwelling-houses and flats		
Walls	45	-
Floors and stairs	45	62
Dwelling – houses and flats formed by material change of use		
Walls	43	-
Floors and stairs	43	64

Building Regulations 1b, E1

Table 2: Building Regulation Table 1b, E1		
Rooms for residential purposes – performance standards for separating walls, floors, and stairs that have a separating function.		
	Airborne Sound Insulation $DnT,w+C_{tr}$ dB (min. value)	Impact Sound Insulation LnT,w dB (max. value)
Purpose build dwelling-houses and flats		
Walls	43	-
Floor and stairs	45	62
Dwellings – houses and flats formed by material change of use		
Walls	43	-
Floors and stairs	43	64

9.0: Location of measurement

The sound survey was carried out in the following location:

- Airborne sound insulation test on the party floor between 1/F Lounge to the G/F open plan shop.
- Impact sound insulation test on the party Floor between 1/F Lounge to the G/F open plan shop

The Building Regulations minimum requirements of sound insulation to be achieved by newly built flats and houses, formed by material change of use are given in Table 1 (Page 7).

The single figure rating derived from the measured test results are summarized in Table 3 (Page 8).

The actual measured test results and calculations for predictions of single figure rating are presented in Appendix attached.

Table 3: SUMMARY OF SOUND INSULATION TEST RESULTS
Airborne and Impact Sound Insulation Test
374 Brighton Road, Shoreham, Brighton BN43 6RE

TEST	Source Room	Receiving Room	Airborne Test Dnt,w+ctr	Impact Test Lnt,w+ctr	Pass / Fail
1 Floor Test	1/F Flat Lounge	G/F Open plan Shop	46	-	**Pass**
1 Floor Test	1/F Flat Lounge	G/F Open plan Shop	-	44	**Pass**

10.0 COMMENTS AND CONCLUSIONS

Two tests of airborne sound insulation for the floor construction between the first floor flat and the ground floor open plan shop of the property were carried out. Both tests undertaken clearly show that the floor construction successfully meets the minimum requirement, defined in table 1a, of Approved Document E. The tests were carried out in accordance with the requirements of Part E of the building regulations.

From the results obtained it can be seen that there is sufficient evidence in Table 3 (Page 8) that prove normal activities of the occupants of the first floor flat will not interfere with the occupier's usage of the open plan shop, or vice versa.

The results of the airborne and impact sound insulation survey and example of the Ctr (Frequency adaptation term) calculations are included in the Appendix of the report these figures are based on the reverberation time measured during the test and calculated values in the Norwegian Precision sound Analyzer Nor. 140 system

11.0: References

The building Regulation 2000

Approved Document E: Resistance to the passage of sound (2003 Edition, incorporating 2004 and 2010 amendments)

1. BS EN ISO 140-4:1998
   Acoustics – Measurement of sound insulation in buildings and of building elements
2. BS EN ISO 3382-2:2008
   Acoustics – Measurements of room acoustics parameters. Reverberation time in ordinary rooms
3. BS EN ISO 717-1:2003 (Incorporating Amendment 1)
   Acoustics, rating of sound insulation in buildings and of building elements. Airborne sound insulation
4. BS EN ISO 140-7:1998
   Field measurement of impact sound insulation of floors.

APPENDIX

374 Brighton Road,
Shoreham, Brighton BN43 6RE

AIRBORNE AND IMPACT SOUND INSULATION

TEST RESULTS AND ANALYSIS

(Dnt,w , Lnt,w, and Ctr)

374 Brighton Road,
Shoreham, Brighton BN43 6RE

AIRBORNE SOUND INSULATION TEST (Dnt,w + Ctr)
Between: the 1/F Flat Lounge and the G/F Open plan shop.
374 Brighton Road, Shoreham, Brighton BN43 6RE
Calculation of Ctr

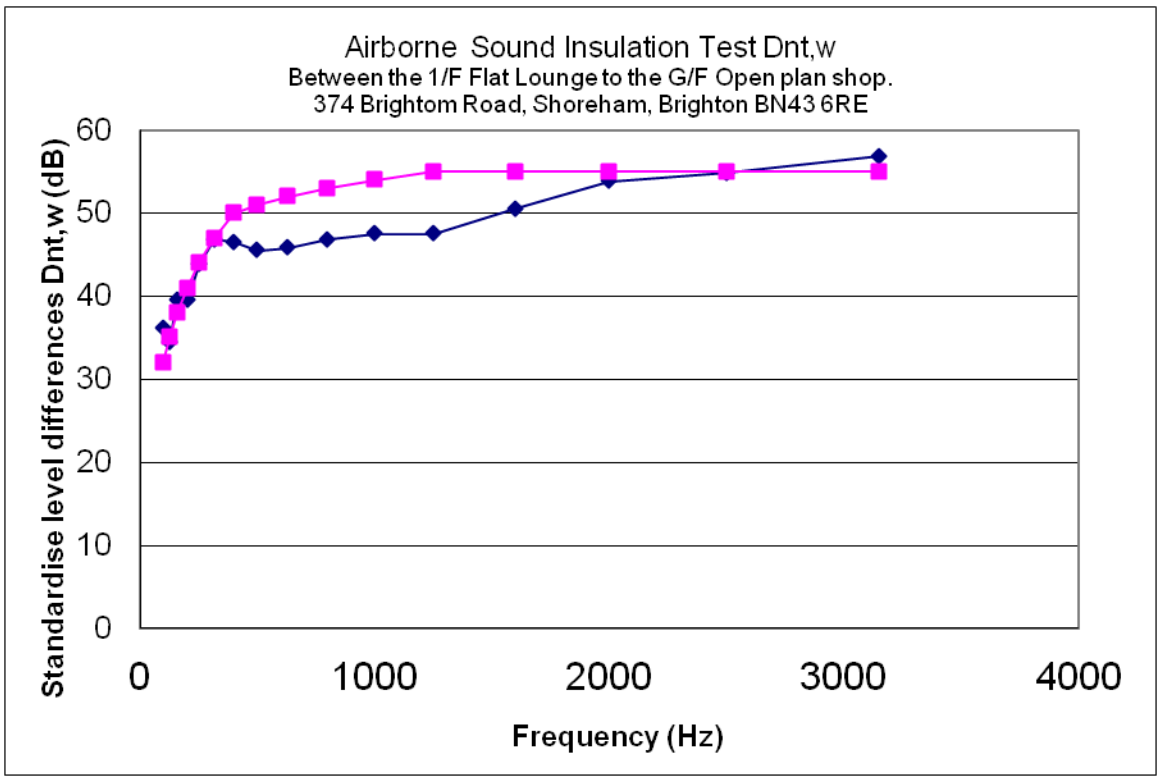
Frequency (Hz)	Reverberation Time T (Sec) G/F Open plan shop	Source room 1/F Flat - Lounge Level L_s dB)	Receiving room G/F Open plan shop Level L_r (dB)	D=Ls-Lr (dB)	10 log(T/To) (dB) To = 0.5	$D_{nt,w}$ (dB)	Reference Values BS EN ISO 717: 1	Shifted Values BS EN ISO 717: 1	Unfavorable Deviation Ref - D_{nt}	C_{tr} Spectrum Lj_2 Levels	Lj_2 - Dnt	$10^{(Lj2 - Dnt) / 10}$ (dB x 10^{-6})
100	1.3	84	52	32	4.1	36.1	33	32.0		-20	-5.6	2.4
125	0.7	88	55	33	1.5	34.5	36	35.0		-20	-5.4	3.6
160	0.7	95	57	38	1.5	39.5	39	38.0		-18	-5.7	1.8
200	0.7	92	54	38	1.5	39.5	42	41.0		-16	-5.5	2.8
250	0.6	90	47	43	0.8	43.8	45	44.0		-15	-5.9	1.3
315	0.6	89	43	46	0.8	46.8	48	47.0		-14	-6.1	1.3
400	0.7	89	44	45	1.5	46.5	51	50.0		-13	-5.9	1.1
500	0.7	82	38	44	1.5	45.5	52	51.0		-12	-5.7	1.8
630	0.6	81	36	45	0.8	45.8	53	52.0	6.2	-11	-5.7	2.1
800	0.6	83	37	46	0.8	46.8	54	53.0	6.2	-9	-5.6	2.6
1000	0.7	90	35	46	1.5	47.5	55	54.0	6.5	-8	-5.5	2.8
1250	0.7	92	34	46	1.5	47.5	56	55.0	7.5	-9	-5.6	2.3
1600	0.7	80	31	49	1.5	50.5	56	55.0	4.5	-10	-6.0	0.9
2000	0.7	80	27	53	0.8	53.8	56	55.0	0.5	-11	-6.5	0.28
2500	0.6	78	24	54	0.8	54.8	56	55.0		-13	-6.8	0.17
3150	0.6	77	21	56	0.8	56.8	56	55.0		-15	-7.2	0.066
									31.6 dB		Dnt,W =64dB Ctr = -10dB Dnt,w +Ctr = 64-10=46dB	Sum = 27x 10^{-6} $-10\log(27.x10^{-6}) = 46dB$ Ctr =46-64= -10dB **Dnt,w + Ctr =46dB**

Table 1: Calculation of Frequency Adaptation Term; Ctr = -10dB, Dnt,w + Ctr = 46dB

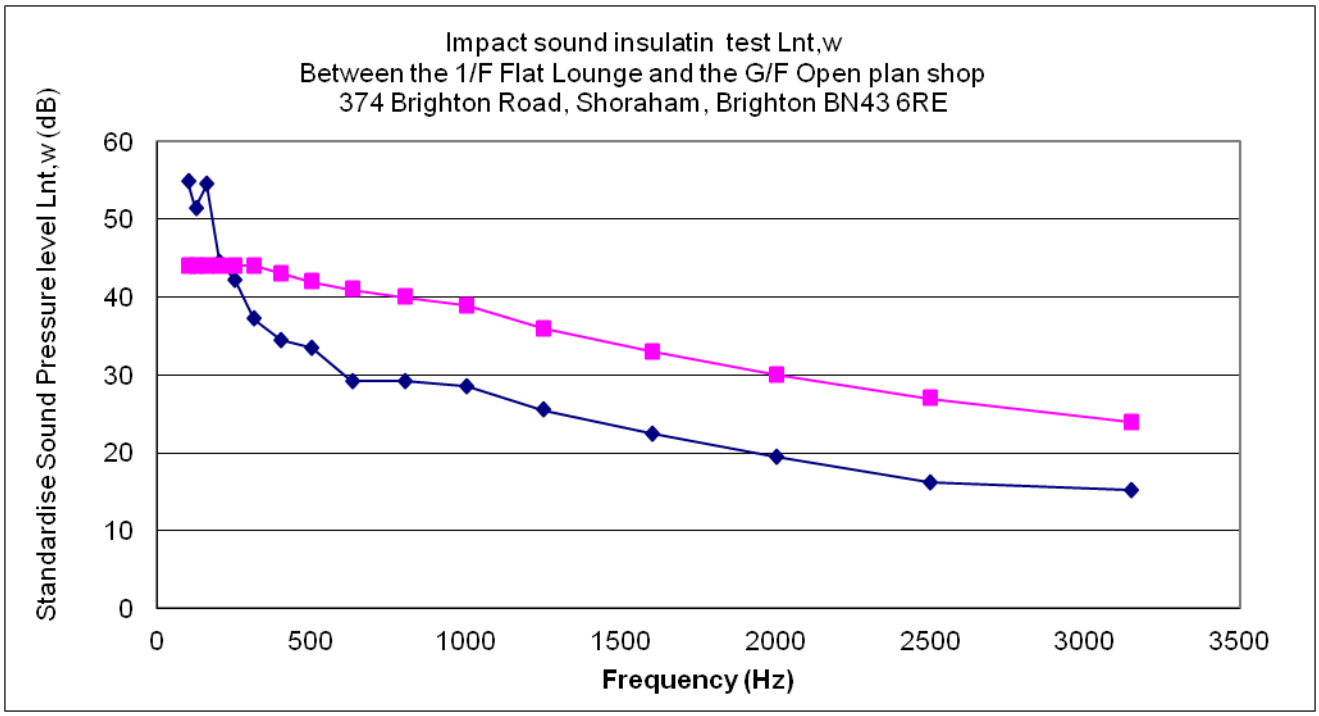
IMPACT SOUND INSULATION TEST (LnT,w)
Between: the 1/F Flat -Lounge and the G/F Open plan shop.
374 Brighton Road, Shoreham, Brigton BN43 6RE

Frequency (Hz)	Reverberation Time (Sec.) G/F Open plan shop	Receiving room G/F Open plan shop L_r (dB)	10 log (T/To) (dB)	L_{nt} (dB)	Reference Values BS EN ISO 717:2	Shifted Values BS EN ISO 717:2	Deviation L_{nt} – Ref.
100	1.3	59	4.1	54.9	62	44	10.9
125	0.7	53	1.5	51.5	62	44	7.5
160	0.7	56	1.5	54.5	62	44	10.5
200	0.7	46	1.5	44.5	62	44	0.5
250	0.6	43	0.8	42.2	62	44	
315	0.6	38	0.8	37.2	62	44	
400	0.7	36	1.5	34.5	61	43	
500	0.7	35	1.5	33.5	60	42	
630	0.6	30	0.8	29.2	59	41	
800	0.6	30	0.8	29.2	58	40	
1000	0.7	30	1.5	28.5	57	39	
1250	0.7	27	1.5	25.5	54	36	
1600	0.7	24	1.5	22.5	51	33	
2000	0.7	21	0.8	19.5	48	30	
2500	0.6	17	0.8	16.2	45	27	
3150	0.6	16	0.8	15.2	42	24	
						Total Deviation :	29.5 dB

Table 8: Impact sound insulation test: Lnt,w = 44 dB



Graph 1: Airborne sound insulation test Dnt,w = 55dB



Graph 2: Impact sound insulation test Lnt,w = 44dB

UKAS Calibrated Equipment Used on Side;



Fig. 3: Norsonic Power Amplifier with Hemisphere load speaker.

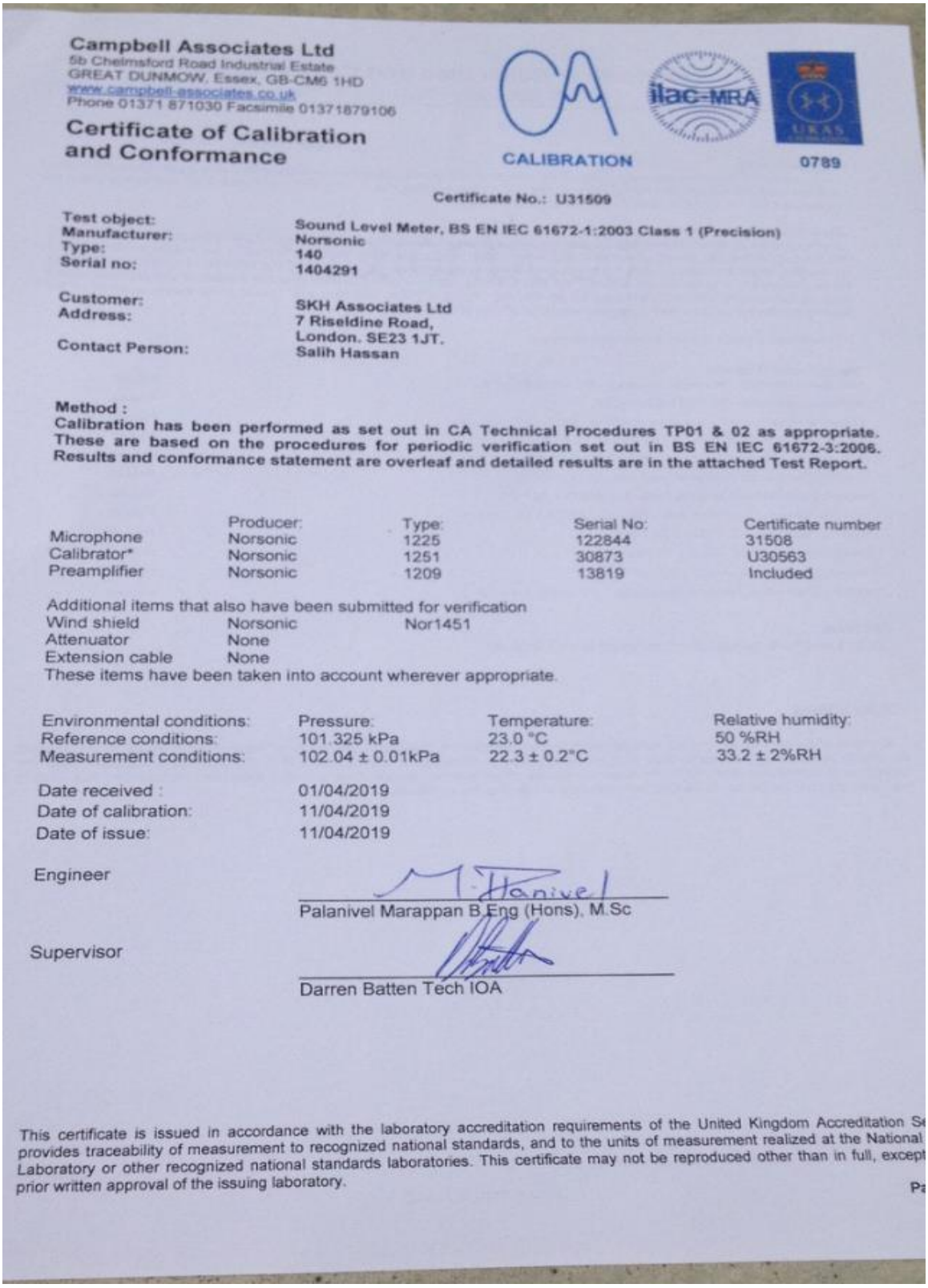


Fig. 4: Norsonic Tapping Machine Nor. 277.



Fig. 5: Norsonic Precision Sound Analyzer, Nor. 140.

UCAS CALIBRATION CERTIFICATE



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Phone 01371 871030 Facsimile 01371879106

CALIBRATION 0789

Certificate of Calibration and Conformance

Certificate No.: U31509

Test object:	**Sound Level Meter, BS EN IEC 61672-1:2003 Class 1 (Precision)**
Manufacturer:	**Norsonic**
Type:	**140**
Serial no:	**1404291**
Customer:	**SKH Associates Ltd**
Address:	**7 Riseldine Road, London. SE23 1JT.**
Contact Person:	**Salih Hassan**

Method :
Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. These are based on the procedures for periodic verification set out in BS EN IEC 61672-3:2006. Results and conformance statement are overleaf and detailed results are in the attached Test Report.

	Producer:	Type:	Serial No:	Certificate number
Microphone	Norsonic	1225	122844	31508
Calibrator*	Norsonic	1251	30873	U30563
Preamplifier	Norsonic	1209	13819	Included

Additional items that also have been submitted for verification

Wind shield	Norsonic	Nor1451
Attenuator	None	
Extension cable	None	

These items have been taken into account wherever appropriate.

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	102.04 ± 0.01kPa	22.3 ± 0.2°C	33.2 ± 2%RH

Date received :	01/04/2019
Date of calibration:	11/04/2019
Date of issue:	11/04/2019

Engineer

Palanivel Marappan B.Eng (Hons), M.Sc

Supervisor

Darren Batten Tech IOA

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