NO. 209 BOXLEY ROAD

MAIDSTONE, KENT ME14 2TL

SOUND INSULATION TESTING

(ANC REGISTERED TASK NO. 18730358 : PASSWORD: QDK2CR)

On behalf of:

Oscar Acoustics

Report No. MRL/100/106.1v1
April 2011

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Report prepared by:
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1.0 SITE & TESTING DETAILS

1.1 MRL Acoustics Limited is registered under the Association of Noise Consultants' Registration Scheme to carry out pre-completion sound insulation testing (ANC Registered Organisation No. 187). The testing was carried out by Mr M. Lawrence who is an approved tester (No. 187/1).

Site Details

1.2 The details of the development at which the sound insulation testing was carried out are as follows:

Site address:	No. 209 Boxley Road, Maidstone, Kent ME14 2TL
Development type:	Flats formed by material change of use
No. of dwellings:	2

Testing Details

1.3 The test details are as follows:

Test Date(s):	7th April 2011
No. separating walls tested:	0
No. of separating floors tested:	2
Cupboards, wardrobes etc:	Yes – No. 209 occupied
Background noise due to:	Intermittent road traffic
Furnishings:	Yes – No. 209 occupied
Floor coverings:	Yes – Carpet pulled back for Impact Tests

1.4 Details of the constructions, test rooms and room volumes are given on the charts in Appendix III. The construction details are based on information provided by the client.

1.5 The tests detailed in this report have been carried out in full accordance with ISO 140-4 and ISO 140-7. All the relevant procedures described in Annex B of Approved Document E (2003) of the Building Regulations have been followed.

1.6 A glossary of the technical terms used in this report is provided in Appendix I. Testing methodology is described in Appendix II.

Equipment

1.7 Details of the equipment used during the sound insulation tests are shown in Table 1. Current calibration certificates for the equipment can be provided if required.

Table 1: Details of Equipment Used During Sound Insulation Tests

Equipment Description	Manufacturer	Type Number	Serial Number	Date of Expiration of Calibration	Calibration Certification Number
Sound Level Meter	Rion	Type NA-28	01291241	02/02/2012	CONF021002
Calibrator	Rion	Type NC-74	35094450	02/02/2012	CONF021001
Tapping Machine	ANV	Type TM01	TM01008	04/02/2012	CONF021004
Power Amplifier	Stage Line Foldback Speaker	MAK-12P 12" 180W 248740	X08018311-03	-	-
Sound Source	NTI Audio Noise Generator	Minirator MR2	-	-	-

2.0 ASSESSMENT OF MEASURED SOUND INSULATION PERFORMANCE

Sound Insulation Test Results

2.1 The results of the sound insulation tests are detailed in Appendix III and are summarised in Table 2.

Table 2: Sound Insulation Test Results

Test No.	Source Room	Receiver Room	Test Type & Required Sound Insulation	Measured Sound Insulation	Pass/Fail
1	No. 209 Kitchen ($49m^3$)	No. 209a Kitchen ($49m^3$)	Airborne Floor 43 dB $D_{nT,w} + C_{tr}$ (minimum)	48 dB $D_{nT,w} + C_{tr}$	Pass
2	No. 209 Lounge ($68m^3$)	No. 209a Lounge ($68m^3$)	Airborne Floor 43 dB $D_{nT,w} + C_{tr}$ (minimum)	49 dB $D_{nT,w} + C_{tr}$	Pass
3	No. 209 Kitchen ($49m^3$)	No. 209a Kitchen ($49m^3$)	Impact Floor 64 dB $L'_{nT,w}$ (maximum)	51 dB $L'_{nT,w}$	Pass
3	No. 209 Lounge ($68m^3$)	No. 209a Lounge ($68m^3$)	Impact Floor 64 dB $L'_{nT,w}$ (maximum)	55 dB $L'_{nT,w}$	Pass

Rooms smaller than the recommended volume of $25m^3$ in Approved Document E (2003) of the Building Regulations

Conclusion

2.2 The results in Table 2 show that the tested party floors have met the minimum requirements for sound insulation as specified in Approved Document E (2003) of the Building Regulations for flats formed by material change of use.

2.3 The results of all tests have been registered for certification under the Association of Noise Consultants' Registration Scheme and can be viewed online at **http://www.theanc.co.uk**, then going to 'Building Control' and clicking on the 'ADvANCE' logo, using the Task Reference Number **30358** and Password **QDK2CR**.

APPENDIX I – GLOSSARY OF TERMS

L_{eq} This is the 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{eq} is the level of a continuous noise which has the same total energy as the real fluctuating noise, measured over the same time period.

RT Measured reverberation time in receiver room in seconds.

RT_0 Standard reverberation time of 0.5 seconds

Airborne Sound Insulation Testing

D Level difference, effectively D = source level - (receiver level corrected for background level)

D_{nT} Standardised level difference, standardised to a receiver room reverberation time of 0.5 seconds, $D_{nT} = D + 10 \log (RT/RT_0)$

$D_{nT,w}$ Weighted standardised level difference, a single figure generated by comparing the D_{nT} with a reference curve. The reference curve is shifted in 1dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500Hz is taken as the $D_{nT,w}$. N.B. As $D_{nT,\ w}$ for airborne transmission represents a level difference, an improvement generates a larger figure.

C_{tr} A 'spectrum adaptation term' used to correct the $D_{nT,w}$ in order to reflect low frequency performance of the wall or floor tested.

Impact Sound Insulation Testing

L Level, effectively L = receiver level corrected for background level

L'_{nT} Standardised level, standardised to a receiver room reverberation time of 0.5 seconds, $L'_{nT} = L - 10 \log (RT/RT_0)$

$L'_{nT,w}$ Weighted standardised level, a single figure generated by comparing the L'_{nT} with a reference curve. The reference curve is shifted in 1dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500Hz is taken as the $L'_{nT,w}$. N.B. As $L'_{nT,w}$ for impact transmission represents an absolute level, an improvement generates a smaller figure.

APPENDIX II – TESTING METHODOLOGY

Testing was carried out in accordance with the relevant sections of the methodology detailed below.

Airborne Sound Insulation Tests

Airborne sound insulation measurements involve generating a high noise level on one side of the test sample (source room) and then measuring the difference in noise levels between the source and receiver rooms. The testing was carried out in full accordance with the requirements of the BS EN ISO 140-4:1998: "Field Measurements of Airborne Sound Insulation between Rooms". All the relevant procedures described in Annex B of Approved Document E of the Building Regulations have been followed.

Any airborne tests were carried out using a Rion NA-28 Type 1 Sound Level Meter loaded with the Rion NX-28BA Building Acoustics Program Card. A calibration check was carried out before and after the noise measurements and there was no variation in the calibration level.

Pink noise was produced at high volume in the source room and the resultant diffuse sound field was measured at five locations in the source room and the transmitted sound was measured at five locations in the receiver room. The source was then moved to a new position and a further five source room and receiver room measurements were taken. Therefore a total number of ten source room and ten receiver room measurements were collected. Measurements were taken for a minimum of ten seconds at each position in the source and receiver rooms. Testing was carried out with all source room and receiver room doors and windows closed.

Background L_{eq} noise levels were recorded in the receiver room without the sound source operating. Where applicable, corrections for background noise have been made in accordance with BS EN ISO 140-4, Para 6.6.

Receiver room reverberation time (RT) calculations were made using the interrupted noise method by means of a Minirator MR2 pink noise generator and RT calculation algorithms within the Rion NA-28 sound level meter. A total of six RT measurements were made comprising three measurements at two different microphone positions. The results of the measurements in each room were averaged to establish the RT of the room.

All of the above measurements were made over sixteen third-octave bands 100 Hz to 3150 Hz inclusive.

Impact Sound Insulation Tests

Impact sound insulation measurements involve running a specialised tapping machine on a floor in the source room and measuring the resultant noise level in the receiving room below. The testing of party floors was carried out in full accordance with the requirements of the BS EN ISO 140-7:1998: "Field Measurements of Impact Sound Insulation of Floors". All the relevant procedures described in Annex B of Approved Document E of the Building Regulations have been followed.

Any impact tests were carried out using a Rion NA-28 Type 1 Sound Level Meter loaded with the Rion NX-28BA Building Acoustics Program Card. A calibration check was carried out before and after the noise measurements and there was no variation in the calibration level.

An ANV Type TM01 tapping machine was used as the source for the impact testing. For the tests, the tapping machine was placed in four positions in the source room. Measurements of the impact sound pressure level generated by the tapping machine were measured at a total of eight microphone positions in the receiver room. Measurements were taken for a minimum of 10 seconds at each position in the source room. Testing was carried out with all source room and receiver room doors and windows closed.

Background L_{eq} noise levels were recorded in the receiver room without the tapping machine operating. Where applicable, corrections for background noise have been made in accordance with BS EN ISO 140-7, Para 5.6.

Receiver room reverberation time (RT) calculations were made using the interrupted noise method by means of a Minirator MR2 pink noise generator and RT calculation algorithms within the Rion NA-28 sound level meter. A total of six RT measurements were made comprising three measurements at two different microphone positions. The results of the measurements in each room were averaged to establish the RT of the room.

All of the above measurements were made over sixteen third-octave bands 100 Hz to 3150 Hz inclusive.

Sound Insulation Test Results Calculation and Rating

The results of any airborne sound insulation tests have been standardised and rated in accordance with the requirements of EN ISO 717 Part 1: 1997 "Rating of sound insulation in buildings and of building elements - Field measurement of airborne sound insulation between rooms".

The results of any impact sound insulation tests have been standardised and rated in accordance with the requirements of EN ISO 717 Part 4: 1997 "Rating of sound insulation in buildings and of building elements - Field measurement of impact sound insulation of floors".

The single number indices for $D_{nT,w}$, C_{tr} and $L'_{nT,w}$ have been calculated using in-house spreadsheets to ensure that the level differences obtained from each source position have been arithmetically averaged as required in Annex B, Paragraph B2.6 of Approved Document E (2003).

APPENDIX III – SOUND INSULATION TEST SHEETS

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

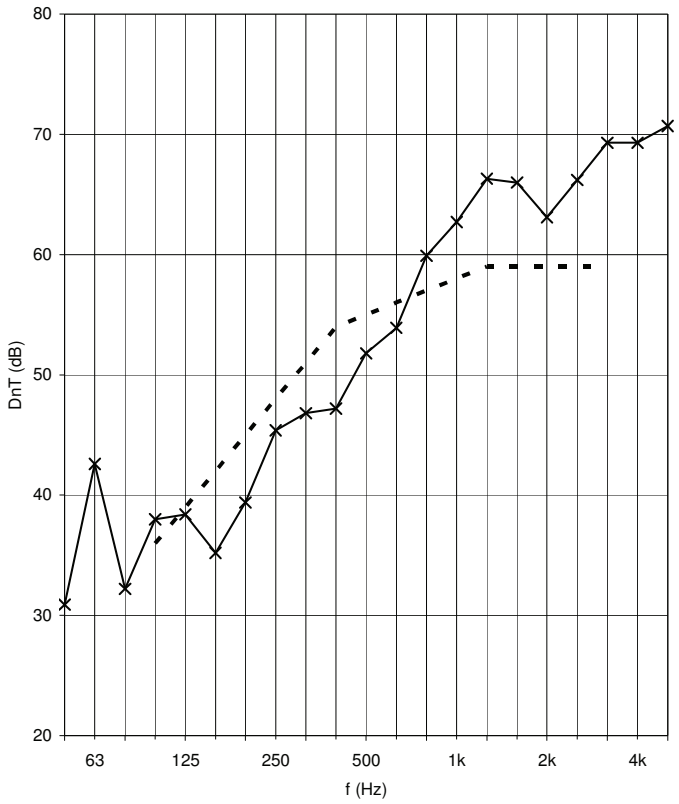
Client: Oscar Acoustics Date of test: 07/04/2011

Source Room: No. 209 Kitchen
Reciever Room: No. 209a Kitchen

Party Floor: Existing timber joist floor; ceiling removed and Celbar Acoustic Brackets fitted to the joists with 2 layers of 15mm SoundBloc plasterboard fitted on gypliner system, floor void then completely filled with Celbar insulation material

Source room volume (m^3): 49 - - - - - - - Shifted reference curve.
Receiving room volume (m^3): 49 ---x---x--- Measurement results (DnT values).

Frequency f Hz	DnT (1/3 octave) dB
50	>= 30.9
63	>= 42.6
80	32.2
100	38.0
125	38.4
160	35.2
200	39.4
250	45.4
315	46.8
400	47.2
500	51.8
630	53.9
800	>= 59.9
1000	>= 62.7
1250	>= 66.3
1600	>= 66
2000	>= 63.1
2500	>= 66.2
3150	>= 69.3
4000	69.3
5000	>= 70.7



Rating according to ISO 717-1

DnT,w (C; Ctr) = 55 (-2; -7) dB No error

Evaluation based on field measurement
results obtained by an engineering method

No. of test report: MRL/100/106.1v1 Name of test institute: MRL Acoustics Ltd

Date: 09/04/2011 Signature:

Standardized level difference according to ISO 140-4
Field measurements of airborne sound insulation between rooms

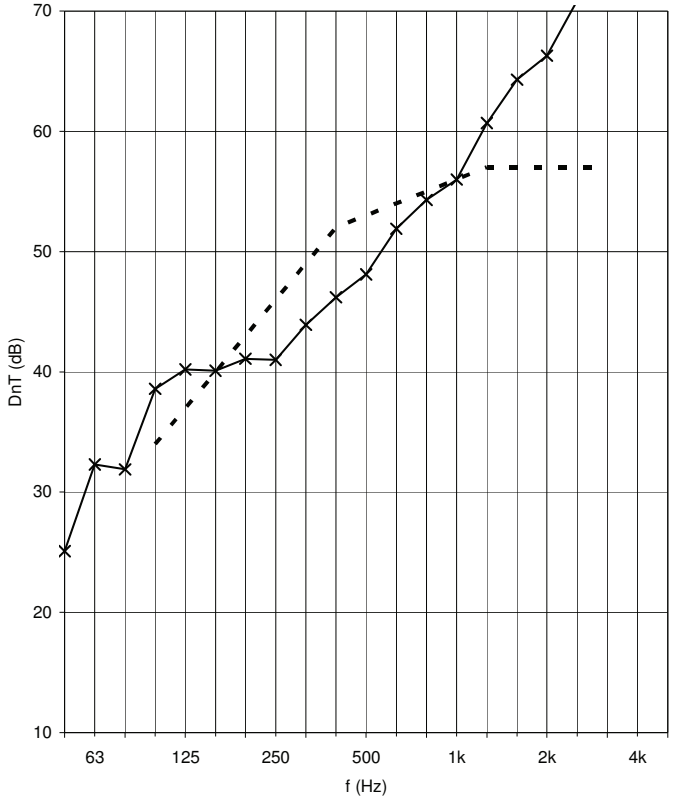
Client: Oscar Acoustics Date of test: 07/04/2011

Source Room: No. 209 Lounge
Reciever Room: No. 209a Lounge

Party Floor: Existing timber joist floor; ceiling removed and Celbar Acoustic Brackets fitted to the joists with 2 layers of 15mm SoundBloc plasterboard fitted on gypliner system, floor void then completely filled with Celbar insulation material

Source room volume (m^3): 68 - - - - - - - Shifted reference curve.
Receiving room volume (m^3): 68 ---x---x--- Measurement results (DnT values).

Frequency f Hz	DnT (1/3 octave) dB
50	25.1
63	32.3
80	31.9
100	38.6
125	40.2
160	40.1
200	41.1
250	41.0
315	43.9
400	46.2
500	48.1
630	51.9
800	54.3
1000	56.0
1250	60.7
1600	>= 64.3
2000	>= 66.3
2500	>= 70.9
3150	>= 75.3
4000	>= 77.8
5000	>= 78.5



Rating according to ISO 717-1

DnT,w (C; Ctr) = 53 (-1; -4) dB No error

Evaluation based on field measurement
results obtained by an engineering method

No. of test report: MRL/100/106.1v1 Name of test institute: MRL Acoustics Ltd

Date: 09/04/2011 Signature:

Standardized impact sound pressure levels according to ISO 140-7
Field measurements of impact sound insulation of floors

Client: Oscar Acoustics Date of test: 07/04/2011

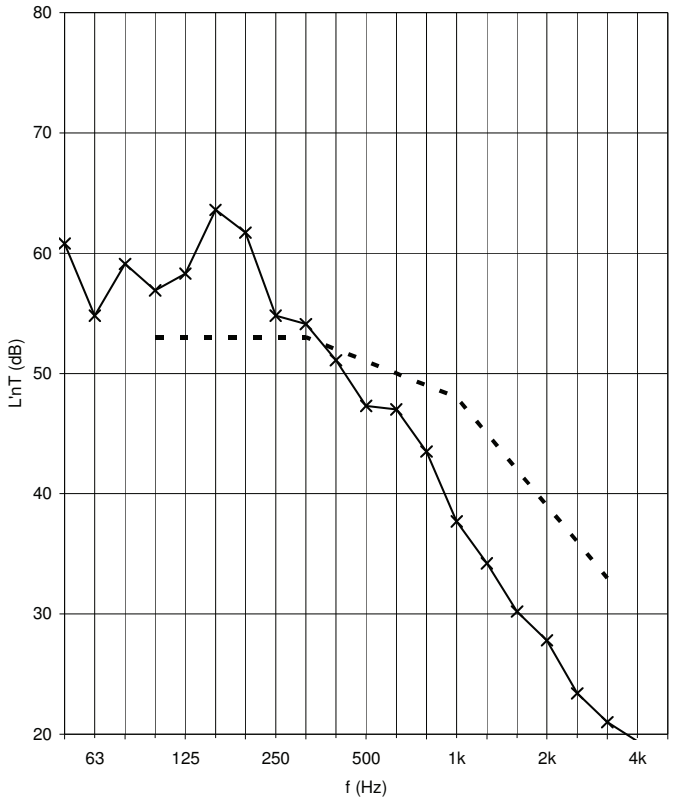
Source Room: No. 209 Kitchen
Reciever Room: No. 209a Kitchen

Party Floor: Existing timber joist floor; ceiling removed and Celbar Acoustic Brackets fitted to the joists with 2 layers of 15mm SoundBloc plasterboard fitted on gypliner system, floor void then completely filled with Celbar insulation material

Receiving room volume (m^3): 49

- - - - - - - Shifted reference curve.
---x---x--- Measurement results (L'nT values).

Frequency f Hz	L'nT (1/3 octave) dB
50	60.8
63	54.8
80	59.1
100	56.9
125	58.3
160	63.6
200	61.7
250	54.8
315	54.1
400	51.1
500	47.3
630	47.0
800	43.5
1000	37.7
1250	34.2
1600	<= 30.2
2000	<= 27.8
2500	<= 23.4
3150	<= 21
4000	<= 19.4
5000	<= 15.9



Rating according to ISO 717-2

L'nT,w (CI) = 51 (2) dB No error

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

No. of test report: MRL/100/106.1v1 Name of test institute: MRL Acoustics Ltd

Date: 09/04/2011 Signature:

Standardized impact sound pressure levels according to ISO 140-7
Field measurements of impact sound insulation of floors

Client: Oscar Acoustics Date of test: 20/04/2011

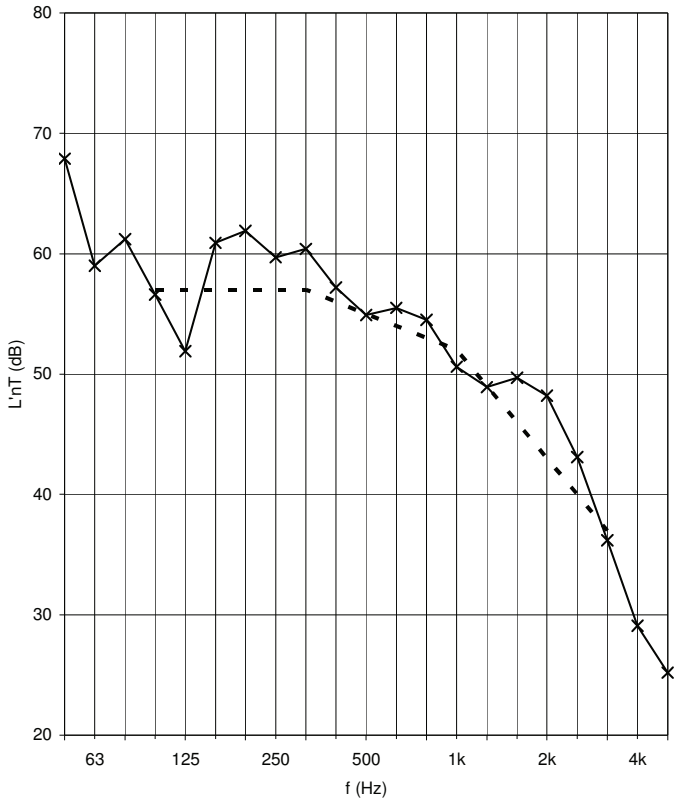
Source Room: No. 209 Lounge
Reciever Room: No. 209a Lounge

Party Floor: Existing timber joist floor; ceiling removed and Celbar Acoustic Brackets fitted to the joists with 2 layers of 15mm SoundBloc plasterboard fitted on gypliner system, floor void then completely filled with Celbar insulation material

Receiving room volume (m^3): 68

- - - - - - - Shifted reference curve.
---x---x--- Measurement results (L'nT values).

Frequency f Hz	L'nT (1/3 octave) dB
50	67.9
63	59.0
80	61.2
100	56.6
125	51.9
160	60.9
200	61.9
250	59.7
315	60.4
400	57.2
500	54.9
630	55.5
800	54.5
1000	50.6
1250	48.9
1600	49.7
2000	48.2
2500	43.1
3150	36.2
4000	29.1
5000	25.2



Rating according to ISO 717-2

L'nT,w (CI) = 55 (-1) dB No error

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

No. of test report: MRL/100/106.1v1 Name of test institute: MRL Acoustics Ltd

Date: 21/04/2011 Signature: