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Consultants in Noise and Vibration

Consultancy Report
Ref: 11548-R01

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NOISE ASSESSMENT FOR PROPOSED DEVELOPMENT AT 15 OATMEAL ROW, SALISBURY

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UNIVERSITY OF Southampton

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1. Introduction

ISVR Consulting was asked to carry out a noise assessment for the proposed development of a listed building at 15 Oatmeal Row, Salisbury. The noise assessment is intended to assess the sound insulation provided by the building envelope in order to achieve appropriate indoor ambient noise levels due to the exterior noise levels affecting the property.

The noise levels in the area have been assessed in order to meet the interior noise criteria recommended in BS8233:2014.

An unattended noise survey was carried out over a 90-hour period at the front and rear of the building with additional spot measurements taken on site in order to assess the variation in noise level affecting different aspects of the building.

2. Site Description and Noise Sources

It is proposed to develop the existing listed building at 15 Oatmeal Row to provide 3 flats over the first and second floors. The ground floor of the building is used as a commercial unit offering financial services at the time of this report. The proposed floorplans of the flats are shown in Figures 1 and 2. It is also intended to develop the unused loft space on the second floor at a future date.

The site is located between Oatmeal Row and Minster Street, with the eastern facade overlooking Salisbury Market Place and the southern and western facades overlooking Poultry Cross and Minster Street. Minster Street is a busy road that incorporates a bus route, while Market Place and Poultry Cross as used for a market on Saturdays and Tuesdays. In addition to the market activities The Ox Row Inn has an outdoor seating area in the market place and there is also outdoor seating along Oatmeal Row. The site location is shown in Figure 3.

The eastern facade of the building is primarily exposed to indirect traffic noise as well as noise of pedestrian, café and market activities. The southern and western facades are primarily exposed to traffic noise on Minster Steet and noise from people within Poultry Cross during evening and night time periods.

In addition to the noise sources identified above there are 2 Midea air conditioning units installed within the roof valley, used by the ground floor commercial business.

3. Planning Guidance

The comments from the local authority regarding the noise assessment are shown below:

I have reviewed the above application for change of use to residential on the upper floors and retention of commercial on the ground floor, and have read the email exchange between the applicant and my colleague.

This application involves the introduction of residential properties with habitable rooms facing into the busy commercial area of the Poultry Cross and Market Square. These commercial areas regularly have live amplified music events, the twice weekly market, annual charter fair etc. In addition I note bedrooms will face Minster Street, which is a busy bus route and transport route through the city centre . Directly opposite the proposed bedroom on Minster Street is a licenced premise with opening hours up to 2.30am, and can have live and recorded amplified music up to 2am inside the premise as part of their premises licence.

As this is a listed building its likely to have single glazed windows. It is foreseeable therefore, that some sort of secondary glazing will required to mitigate the anonymous city centre noise from traffic, people, and other noise sources in the surrounding area. A noise impact assessment has not been submitted with the application to demonstrate ambient internal noise levels can be achieved.

A Noise Impact Assessment is required to assess the internal noise levels which should make recommendations for secondary glazing. It is also likely mechanical ventilation will also be required in order that future residents can suitably ventilate their properties without having to open their windows.

The noise assessment should also assess the impact of any plant in the proximity of the proposed residential dwellings including the air conditioning unit located on the roof, and it would be beneficial for the survey to also assess noise transfer between the commercial unit on the ground floor and the first floor residential property.

4. Exterior Noise Survey

In order to assess the exterior noise levels affecting the site an unattended noise survey was carried out at two positions over a 90 hour period. The noise monitoring locations are shown in Figure 3 with Position 1 located in the facade condition at first floor level overlooking Market Place, and Position 2 located in the facade condition at first floor level overlooking Poultry Cross. An unattended noise survey was carried out between 17.00 hrs on Friday 15th September and 09.00 hrs on Tuesday 19th September 2023. During this period the weather remained dry with light winds on Friday and Saturday. There was heavy rain on Sunday while on Monday there was light rain and a moderate breeze although this was not considered to significantly affect the measured noise levels.

The noise levels were measured using a Rion Type NL31 Logging Sound Level Meter. The meter was calibrated before and after the measurement period. No significant drift was noted in the calibration. The calibration is traceable to National Standards. The microphone was installed in the facade condition. Additional spot measurements were carried out using an NTi Audio XL2 sound level meter. These measurements were used to provide correction between measurement positions 1 and 2 and the upper floor of the site.

From the measured data the noisiest periods of activity were selected to provide a 24hr measurement. For the Position 1 this included 17.00 hrs on Friday to 17.00 hrs on Saturday such that the noise of the Saturday market and use of cafes and restaurants were represented. For the Position 2 this included 17.00 hrs to 01.00 hrs on Saturday night and 01.00 hrs to 17.00 hrs on Monday such that night-time activities in the Poultry Cross area as well as busy traffic periods were included.

The results of the noise survey at Positions 1 and 2 are shown in Figures 4-7 showing the ambient noise level (dB $L_{Aeq,\ 5mins}$) and maximum night time noise levels (dB $L_{Amax,f\ 5mins}$) throughout the selected measurement periods. The noise data was used to calculate the average daytime and night-time noise levels, as well as the typical maximum night-time noise levels not exceeded more than 5 times per night.

In addition the spot level measurement were used to estimate the noise level within the rood valley affecting Flat 3 on the second floor.

Based on the results of the noise survey, the typical exterior noise levels at the eastern, southern and western facades of the building as well as the roof valley are shown in Table 1 below:

Location	**Daytime dB $L_{Aeq,16hr}$**	**Night Time dB $L_{Aeq,8hr}$**	**Night Time dB L_{Amax}**
Eastern Facade	61	52	78
Southern Facade	62	57	84
Western Facade	62	57	84
Roof Valley	57	53	79

Table 1: Measured Exterior Facade Noise Levels

In addition to the above measurement data, the noise level of the Midea air conditioning units on the roof was measured to be 55 dB(A) at 1.5 m from the air conditioning units. There is a roof light located approximately 1m from the air conditioning unit and as such this may be exposed to a noise level of approximately 59 dB(A) during the daytime or night time periods.

5. Interior Noise Survey

The sound insulation of the existing floor construction between the first floor and ground floor commercial premises was tested.

The existing construction provides a sound insulation of $D_{nT,w} + C_{tr}$ = 59 dB. This compares to a minimum Building Regulations requirement of $D_{nT,w} + C_{tr}$ = 43 dB for the sound insulation between converted residential properties and as such is very good level of sound insulation and is more than adequate to protect the first floor flat from noise on the ground floor.

The sound test results are shown in Figure 8.

6. Recommended Exterior Noise Mitigation

The noise levels recommended by BS8233:2014 suggest interior noise levels of 35 dB $L_{Aeq,16\ hour}$ in bedrooms and living rooms and 40 dB $L_{Aeq,16\ hour}$ in dining rooms for the daytime period, and 30 dB $L_{Aeq,8\ hour}$ within bedrooms for the night time period. It is recommended that the maximum noise levels within bedrooms at night should not regularly exceed 45 dB L_{Amax}.

For a property of traditional construction, the sound insulation provided by the building envelope is normally controlled by the acoustic performance of the glazing system. For standard double glazed units the acoustic performance is typically in the range R_w = 30 - 35 dB without trickle vents, reducing to 25 dB with standard trickle vents. For typical single glazed windows the sound insulation if typically R_w = 25 - 30 dB. It is typically assumed that the sound insulation provided by an open window is 15 dB.

In order to control the interior noise levels to the required level, the average interior noise levels have been assessed in accordance with the simple method provided in BS8233:2014. Using this method the interior noise level may be predicted by simply subtracting the sound reduction index of the building element from the exterior noise level. This method is deemed sufficiently robust if the predicted interior noise level is at least 5 dB below the required level.

The floor plans indicate that the proposed flats include living rooms facing the eastern facade and bedrooms and living rooms facing the southern and western facades. In Flat 3 bedroom windows face onto the roof valley. Based upon the assumed exterior noise levels shown in Table 1, the levels of sound insulation required for bedrooms, and living rooms facing the different facades of the building are shown in Table 2 below:

Room Type	Facade	Time Period	Minimum Sound Insulation R_w
Flat 1	South and West	Daytime Average	32 (62-35 + 5)
		Night time Average	32 (57-30 + 5)
		Night Time Maximum	44 (84-45 + 5)
Flat 1 Living	East	Daytime Average	31 (61-35 + 5)
Flat 2 Bedroom	South	Daytime Average	32 (62-35 + 5)
		Night time Average	32 (57-30 + 5)
		Night Time Maximum	44 (84-45 + 5)
Flat 2 Living	South	Daytime Average	32 (62-35 + 5)
Flat 3 Bedroom	West	Daytime Average	32 (62-35 + 5)
		Night time Average	32 (57-30 + 5)
		Night Time Maximum	44 (84-45 + 5)
Flat 3 Bedroom	Roof Valley	Daytime Air Con	29 (59-35 + 5)
		Night time Air Con	34 (59-30 + 5)
		Night Time Maximum	39 (79-45 + 5)
Flat 3 Living	East	Daytime Average	31 (61-35 + 5)

Table 3: Recommended Sound Insulation Levels

The recommended sound insulation levels shown in Table 3 are typically controlled by the maximum night time noise level, with a recommended level of sound insulation of Rw = 39 - 44 dB.

Since this is a listed building it is considered that the existing glazing will be retained and secondary glazing fitted. The typical sound insulation performance of secondary glazing is shown in Figure 9 which indicates that secondary glazing can provide sound insulation of Rw = 47 – 53 dB subject to configuration. This is significantly better than the minimum sound insulation requirement.

With regards ventilation, it is considered that open windows will not provide adequate sound insulation therefore ventilation may be provide through acoustically treated vents or alternatively by mechanical ventilation.

If acoustic vents are installed it is recommended that they should have an acoustic performance of no less than 45 dB, such as the acoustic air brick shown in the Appendix.

7. Conclusions

ISVR Consulting was asked to carry out an assessment of the sound insulation requirements for the proposed development of 15 Oatmeal Row, Salisbury to provide 3 flats over the first and second floors. The findings of the assessment are summarised below:

- It is proposed to develop the existing listed building at 15 Oatmeal Row to provide 2 flats on the first floor and a single flat on the second floor. There is a commercial premises on the ground floor.
- The eastern facade site is exposed to noise from activities in Salisbury Market Place and the nearby cafes and restaurants. The southern and western facades are mainly exposed to traffic noise from Minster Street.
- An unattended noise survey was carried out over a 90 hour period at positions representing the different facades of the property. Spot measurements we taken to assess the noise levels within the roof valley.
- The measured noise levels were used to calculate the average daytime and night-time noise levels, and maximum night-time noise levels affecting the property.
- The sound insulation of the floor construction between the ground floor commercial premises and first floor was tested and was found to provide a good level of sound insulation
- Based upon the measured exterior noise levels, it is considered that secondary glazing will provide more than adequate sound insulation in order to comply with the interior noise levels recommended by BS8233:2014.
- This report is also relevant to the proposed future development of the loft space on the second floor.

Figures

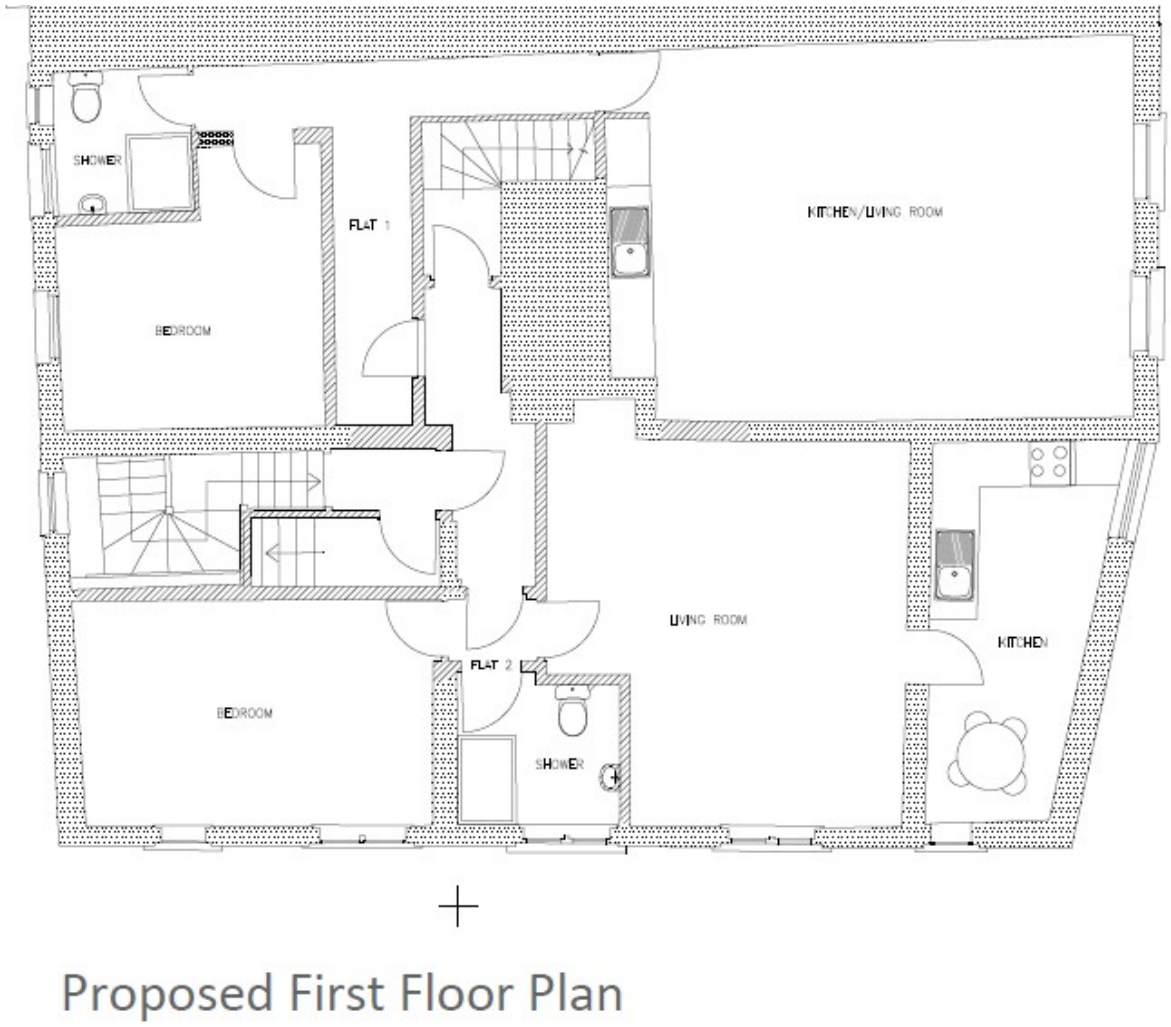


Figure 1: Proposed First Floor Plans

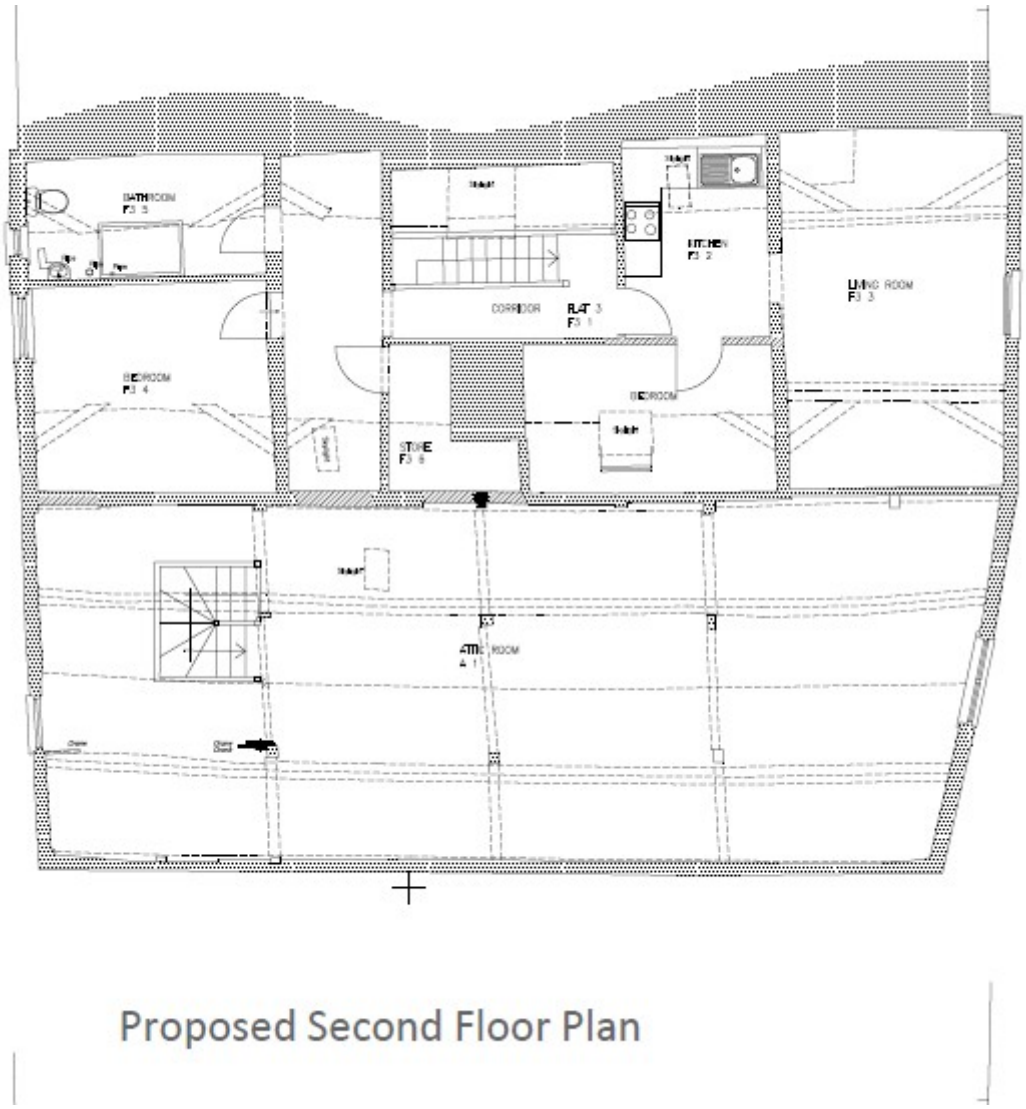


Figure 2: Proposed Second Floor Plans



Figure 3: Site Location and Measurement Positions

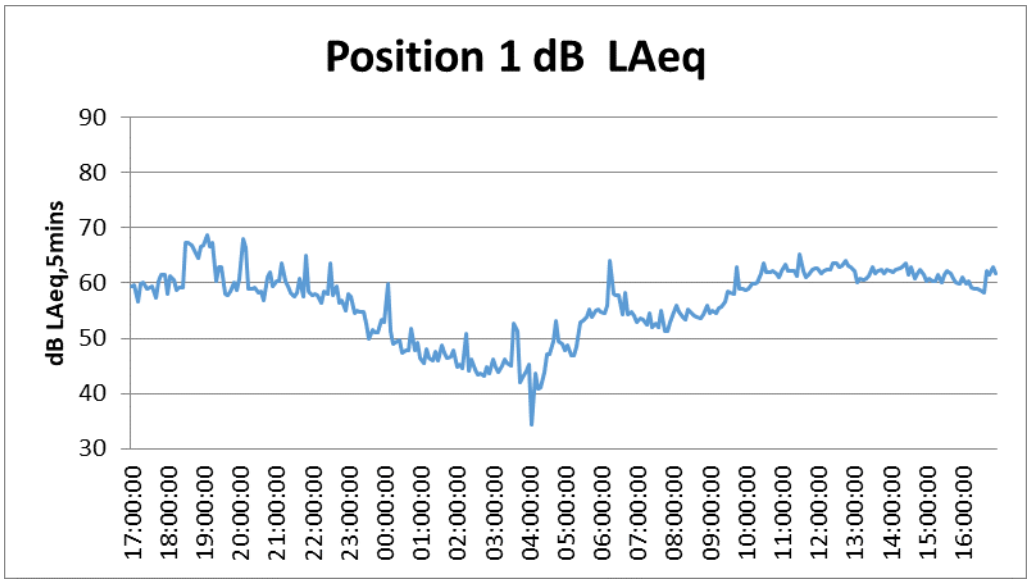


Figure 4: Position 1 Noise Levels dB $L_{Aeq,5mins}$

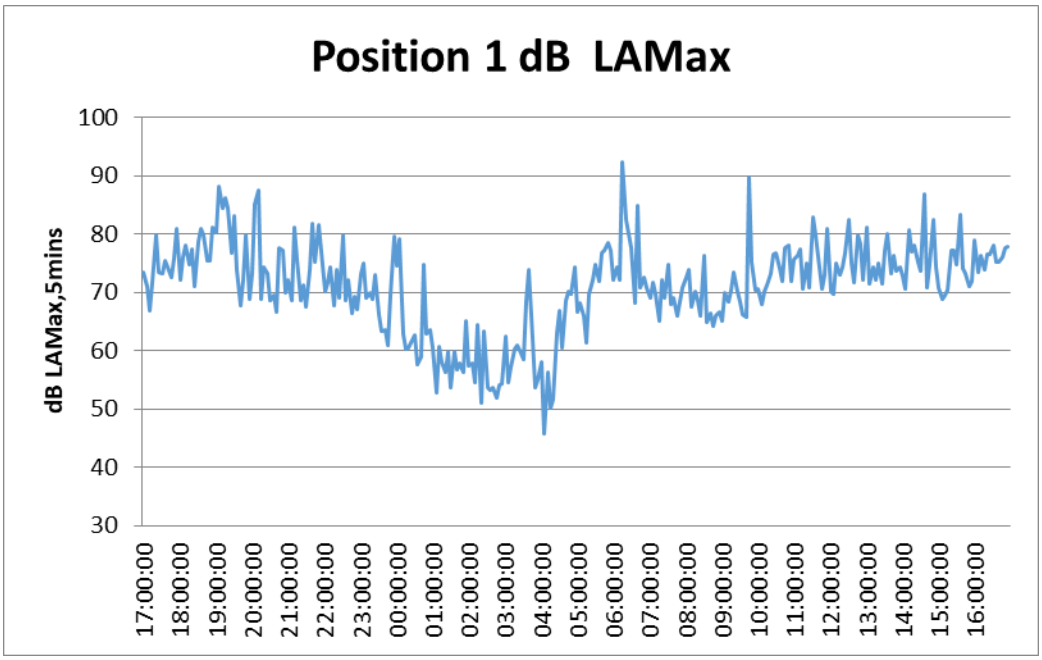


Figure 5: Position 1 Noise Levels dB $L_{Amax,5mins}$

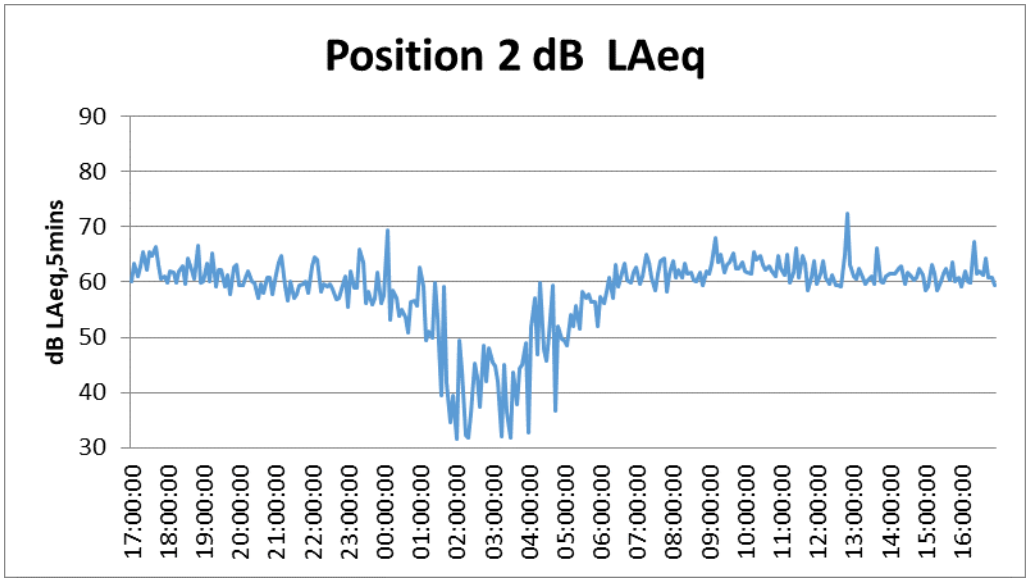


Figure 6: Position 2 Noise Levels dB $L_{Aeq,5mins}$

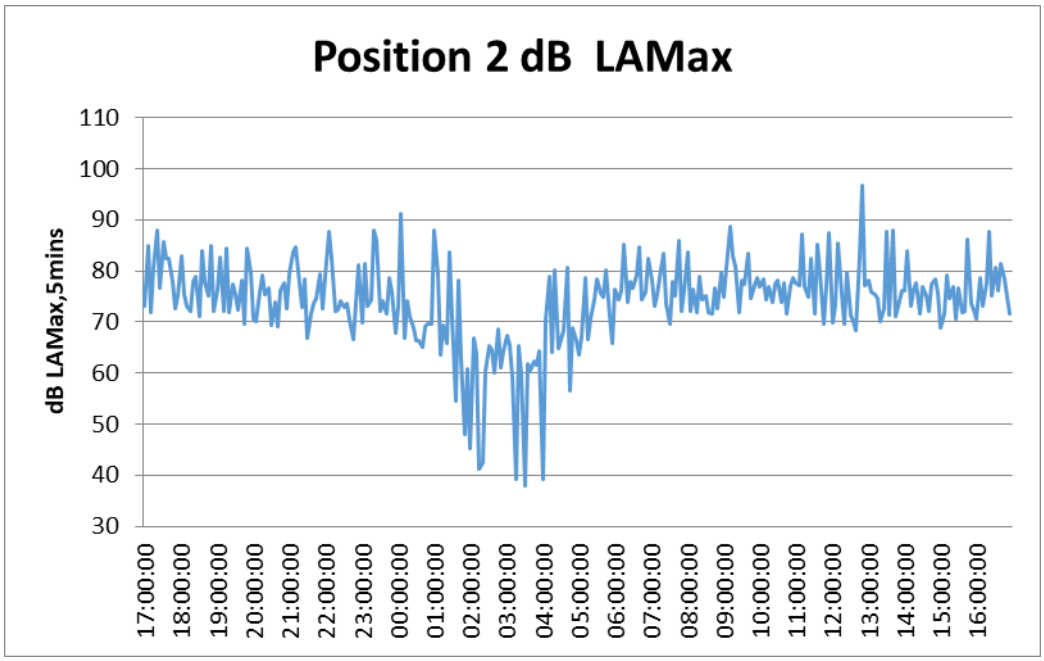


Figure 7: Position 2 Noise Levels dB $L_{Amax,5mins}$

FIGURE 8:Field Measurements of airborne sound Insulation between rooms

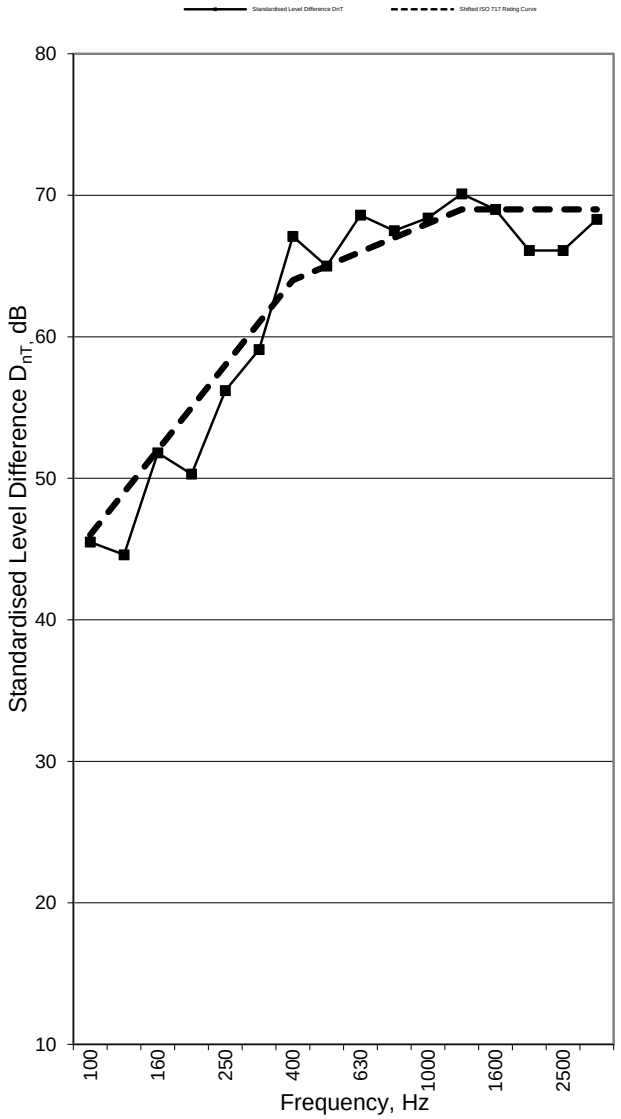
First Floor to Ground Floor Office

To determine the *Standardised Level Difference according to ISO 140-4*

(NB. Higher $D_{nT,w}$ figures denote better sound insulation performance)

Construction tested: Floor

Frequency Hz	D_{nT} dB
100	45.5
125	44.6
160	51.8
200	50.3
250	56.2
315	59.1
400	67.1
500	65.0
630	68.6
800	67.5
1000	68.4
1250	70.1
1600	69.0
2000	66.1
2500	66.1
3150	68.3



Source Vol		m^3
Rec Vol		m^3

$D_{nT,w}$ =	65	dB
C_{tr} =	-6	dB
$D_{nT,w} + C_{tr}$ =	59	dB

>= Indicates Limit of Measurement

Test Standard:	BS EN ISO 140-4	Project No:	11548	Site:	Oatmeal Row
Rating Standard:	BS EN ISO 717-1	ANC No:	122	Client:	Arlington
Test Date:	15.09.23	Test No.			

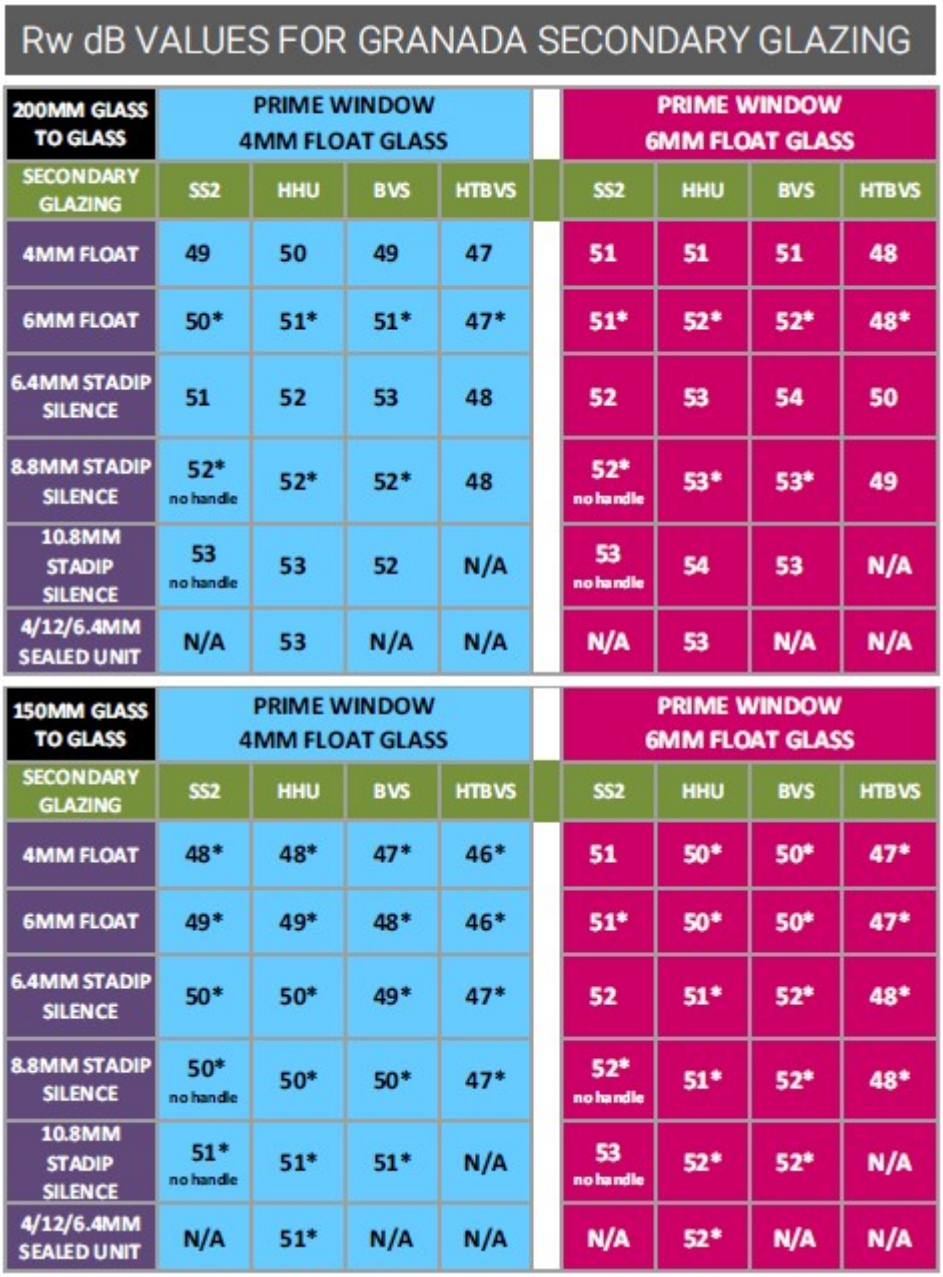
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University of Southampton
Highfield
Southampton

Authorised tester: Andy Varley

Signature:

Figure 8: Sound Insulation between Ground and First Floor



Rw dB VALUES FOR GRANADA SECONDARY GLAZING

200MM GLASS TO GLASS	PRIME WINDOW 4MM FLOAT GLASS				PRIME WINDOW 6MM FLOAT GLASS			
SECONDARY GLAZING	SS2	HHU	BVS	HTBVS	SS2	HHU	BVS	HTBVS
4MM FLOAT	49	50	49	47	51	51	51	48
6MM FLOAT	50*	51*	51*	47*	51*	52*	52*	48*
6.4MM STADIP SILENCE	51	52	53	48	52	53	54	50
8.8MM STADIP SILENCE	52* no handle	52*	52*	48	52* no handle	53*	53*	49
10.8MM STADIP SILENCE	53 no handle	53	52	N/A	53 no handle	54	53	N/A
4/12/6.4MM SEALED UNIT	N/A	53	N/A	N/A	N/A	53	N/A	N/A

150MM GLASS TO GLASS	PRIME WINDOW 4MM FLOAT GLASS				PRIME WINDOW 6MM FLOAT GLASS			
SECONDARY GLAZING	SS2	HHU	BVS	HTBVS	SS2	HHU	BVS	HTBVS
4MM FLOAT	48*	48*	47*	46*	51	50*	50*	47*
6MM FLOAT	49*	49*	48*	46*	51*	50*	50*	47*
6.4MM STADIP SILENCE	50*	50*	49*	47*	52	51*	52*	48*
8.8MM STADIP SILENCE	50* no handle	50*	50*	47*	52* no handle	51*	52*	48*
10.8MM STADIP SILENCE	51* no handle	51*	51*	N/A	53 no handle	52*	52*	N/A
4/12/6.4MM SEALED UNIT	N/A	51*	N/A	N/A	N/A	52*	N/A	N/A

Figure 9: Secondary Glazing Acoustic Performance

Appendix

UKAS

AAB

Acoustic airbrick



Physical specification

All measurements in millimetres unless otherwise indicated

Weight: 6.5kg

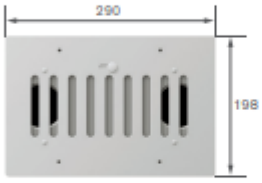
Materials:
Casing – pre-galvanised grey steel. Two steel plate baffles support the perforated aluminium airways encased in sound absorbent mineral wool. An outer baffle assembly and acoustic linings are set behind louvred external grille.



External fascia



Side



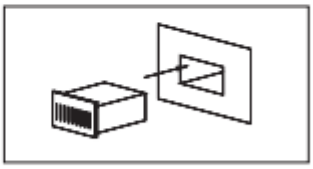
Internal fascia

Features and benefits

- Provides acoustic attenuation to Dn,e,w 46dB
- Acoustic background ventilator
- 2500mm² equivalent area
- Supplied with internal hit & miss and external louvred grilles

Acoustic performance
Dn,e,w: Average weighted performance across frequency range
C: Pink noise
Ctr: Road noise

Installation

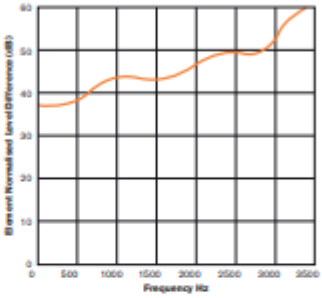


Existing dwellings: Cut an opening 240mm x 165mm through the wall.



New buildings: Build into inner leaf of cavity of wall at least one course above ventilator. Lead flashing to extend 100mm beyond the ventilator on each side.

Performance



Models, control options and key data

	Acoustic performance			
Product code	Dn,e,w	Dn,e,w (C)	Dn,e,w (Ctr)	Equivalent area mm²
AAB *	46dB	46dB	44dB	2500

* Pricing is variable depending on quantity ordered - please call for details