

New Residential Development

**11 Glebe Road,
Reading, RG2 7AG.**

Environmental Noise Assessment

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New Residential Development	
Project Address:	11 Glebe Road Reading RG2 7AG
Project Reference:	104614

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Author:		Andy Dodd	Senior Consultant	19/06/2024
Reviewer:		Phil Huffer	Principal Consultant	19/06/2024

1. INTRODUCTION

- 1.1 Acoustics Plus Ltd (APL) is an independent firm of multi-disciplinary acoustic engineers. APL is engaged by both private and public sector clients. APL is a registered member of The Association of Noise Consultants (ANC) and the author is a corporate member of The Institute of Acoustics (IOA).
- 1.2 APL has been instructed by Landim Ltd to assess the noise implications upon the occupants following the erection of a new build detached house and conversion of a former school building to form 8no. self contained flats.
- 1.3 It is understood that the Local Planning Authority (LPA) will require more information, specifically in regard of noise. It is further understood that the noise matters are in connection with the proposed developments proximity to nearby highways.
- 1.4 The object of this report is to determine environmental noise levels at the site in accordance with Government planning policy. Outline comments regarding any noise control measures will also be provided to demonstrate that the ingress of noise may be properly controlled.
- 1.5 The report will give due regard to the following documents:
 - (a) *National Planning Policy Framework; December 2023 – Department for Levelling Up, Housing & Communities.*
 - (b) *Noise Policy Statement for England (NPSE) March 2010 – Department for Environment, Food and Rural Affairs.*
 - (c) *ProPG: Planning and Noise May 2017 Professional Practice Guidance on Planning and Noise.*
 - (d) *BS8233:2014 “Sound insulation and noise reduction for buildings – Code of Practice”*
- 1.6 This report has been prepared by Acoustics Plus Limited (APL) with all reasonable skill, care, and diligence in accordance with generally accepted acoustic consultancy principles and taking account the services and terms agreed between APL and our client.
- 1.7 Any information provided by third-parties and referred to herein may not have been checked or verified by APL unless expressly stated otherwise. Certain statements made in the report are predictions based on reasonable assumptions and good industry practice.
- 1.8 Such statements involve risk and uncertainty which could cause measured and predicted results to differ materially. APL does therefore not guarantee or warrant any prediction contained in this report.

2. BASELINE SITUATION

- 2.1 The Application Site (the “site”) is located at 11 Glebe Road, Reading, RG2 7AG. The site plan is shown in Diagram 1.

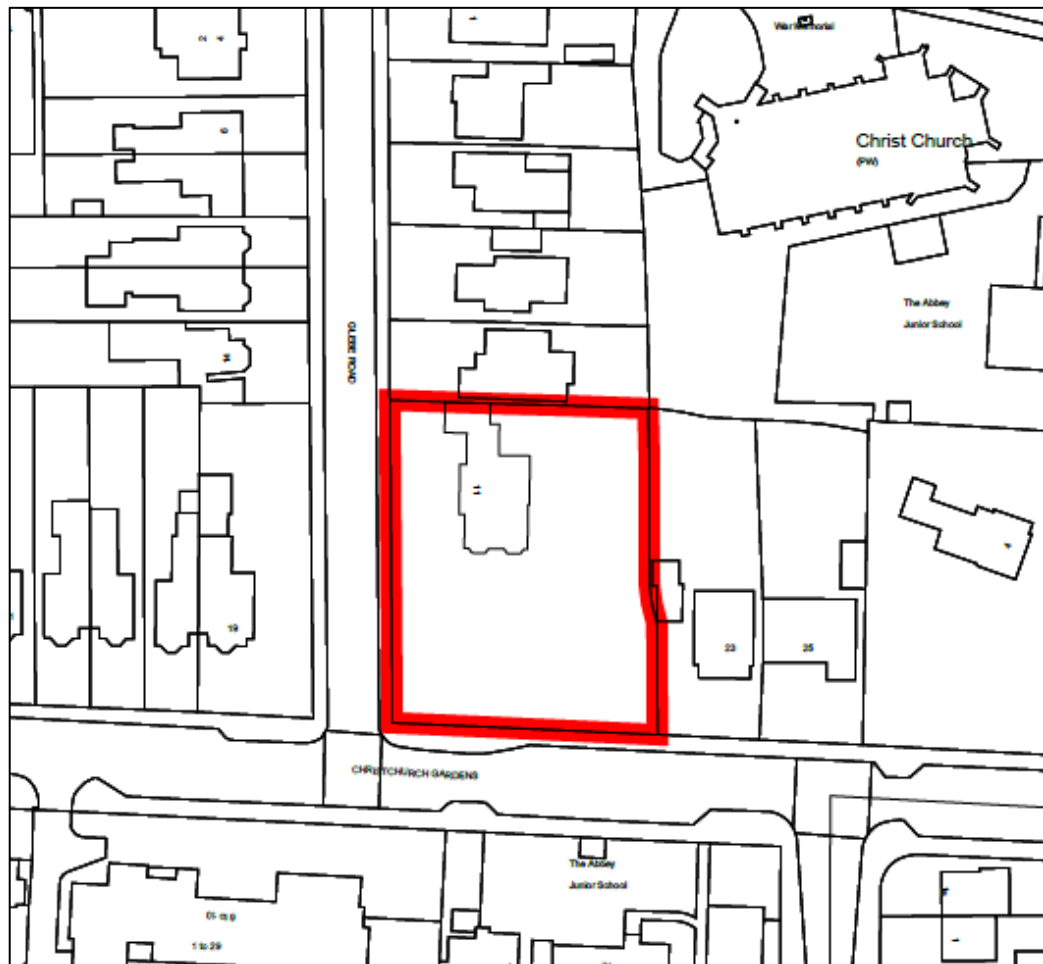


Diagram 1

- 2.2 It is understood that the planning proposal seeks to erect a new detached house and convert a former school building to form 8no. self contained flats.
- 2.3 The site is located in a predominantly residential area with The Abbey school located approximately 50m to the south of the site and with Reading town centre located approximately 1km north of the site.

3. NOISE CRITERIA

NEW RESIDENTIAL ACCOMMODATION

- 3.1 The National Planning Policy Framework (NPPF) was updated in December 2023 and has replaced planning policy guidance which previously covered planning and pollution control and new development in England. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
- 3.2 One of the core planning principles is to contribute to conserving and enhancing the natural environment and reducing pollution. Planning policies and decisions should contribute to and enhance the natural and local environment by;
- *protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
 - *recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland.*
 - *maintaining the character of the undeveloped coast, while improving public access to it where appropriate.*
 - *minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.*
 - *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*
 - *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

3.3 Paragraph 191 of the NPPF states Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

3.4 Paragraph 180 of the NPPF states that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by.... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.”

3.5 The Governments long-term policy aims relating to noise are contained in the Noise Policy Statement for England (referred to as NPSE). Stated aims of the NPSE are:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy of sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life*

3.6 The Professional Practice Guidance on Planning and Noise (ProPG) has been produced to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England. The recommended ProPG internal noise level guidelines are described in the table below. These guidelines reflect and extend current practice contained in BS8233:2014 (Sound Insulation and Noise Reduction for Buildings – Code of Practice). For clarity, blue italic font is used to highlight additions to the guidance contained in Table 4 of BS8233:2014. The dB values provided in the table for different activities are target levels. The table plus supporting notes are referred to as ProPG internal noise level guidelines.

Activity	Location	07:00-23:00hrs	23:00-07:00hrs
Resting	Living room	35dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$ 45dB $L_{Amax,F}$

Table 1

*NOTE 1 The Table provides recommended **internal L_{Aeq} target** levels for overall noise in the design of a building. These are the sum total of structure-borne and airborne noise sources. Ground-borne noise is assessed separately and is not included as part of these targets, as human response to ground-borne noise varies with many factors such as level, character, timing, occupant expectation and sensitivity.*

*NOTE 2 The **internal L_{Aeq} target** levels shown in the Table are based on the existing guidelines issued by the WHO and assume normal diurnal fluctuations in external noise. In cases where local conditions do not follow a typical diurnal pattern, for example on a road serving a port with high levels of traffic at certain times of the night, an appropriate alternative period, e.g. 1 hour, may be used, but the level should be selected to ensure consistency with the **internal L_{Aeq} target** levels recommended in the Table.*

*NOTE 3 These **internal L_{Aeq} target** levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.*

*NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. **In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).***

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

*NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. **The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (see Section 3.D).***

4. NOISE OUTLINE

- 4.1 In order to determine the environmental noise level, consideration should be given to the noise levels on the site from the presence of any nearby commercial activities and urban traffic movements:
- 4.2 Given the location of the proposed development, unattended measurements were obtained externally at first floor level at the northern and southern facades of the existing building (measurement points (MP) 1 & 2), with a series of attended spot measurements obtained at the proposed southern facade of the new build house (MP3).
- 4.3 Noise monitoring equipment was installed as indicated on the site below and left unattended over a 24 hour period. The particulars of the measurement exercise are recorded below:

Date: 28th & 29th May 2024

Start Time: 10:17 hrs.

Location: First floor level at northern and southern facades.



Site plan

4.4 These measurement locations were considered to be indicative of the proposed accommodation types that will be exposed to the noise sources affecting the site. The dominant source of noise is from the A327 Christchurch Road located north of the site and also the local roads neighbouring the development site.

4.5 The measurements carried out during the exercise are recorded below.

$L_{Aeq, 2mins}$ (dB re 20 μ Pa) - average equivalent sound pressure level
 $L_{Amax, 2mins}$ (dB re 20 μ Pa) – maximum sound pressure level.

4.6 A level vs time summary of the noise data obtained at the site are presented in Diagrams 2, 3 & 4 below.

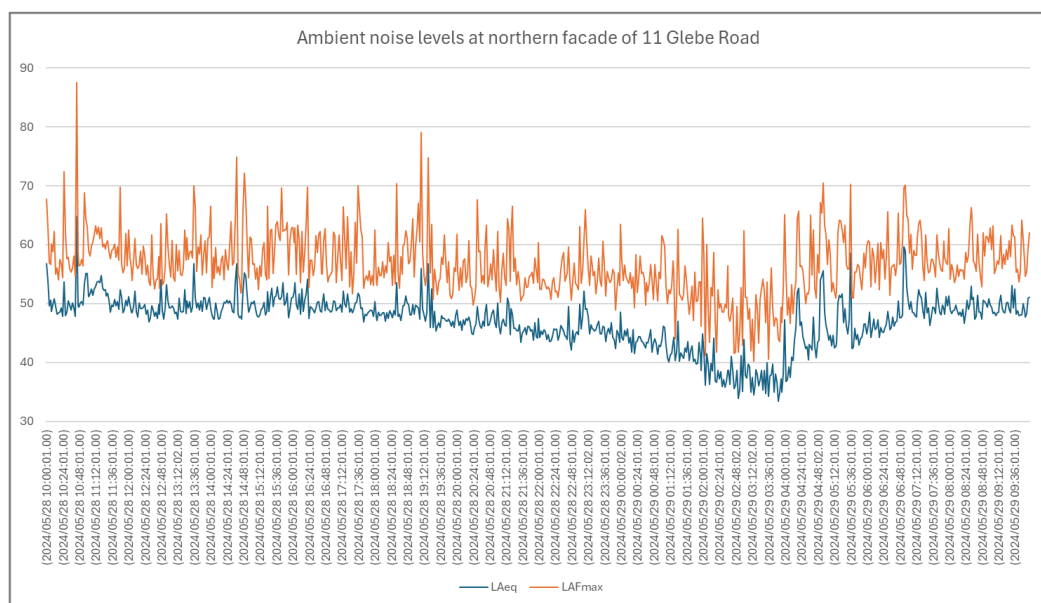


Diagram 2 – level vs time history – MP1

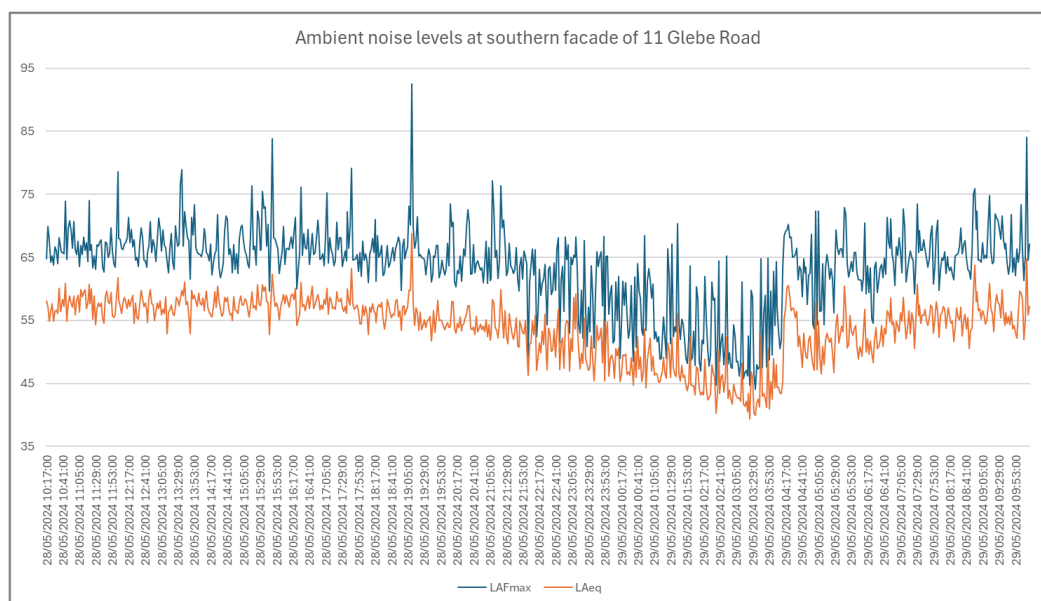


Diagram 3 – level vs time history - MP2

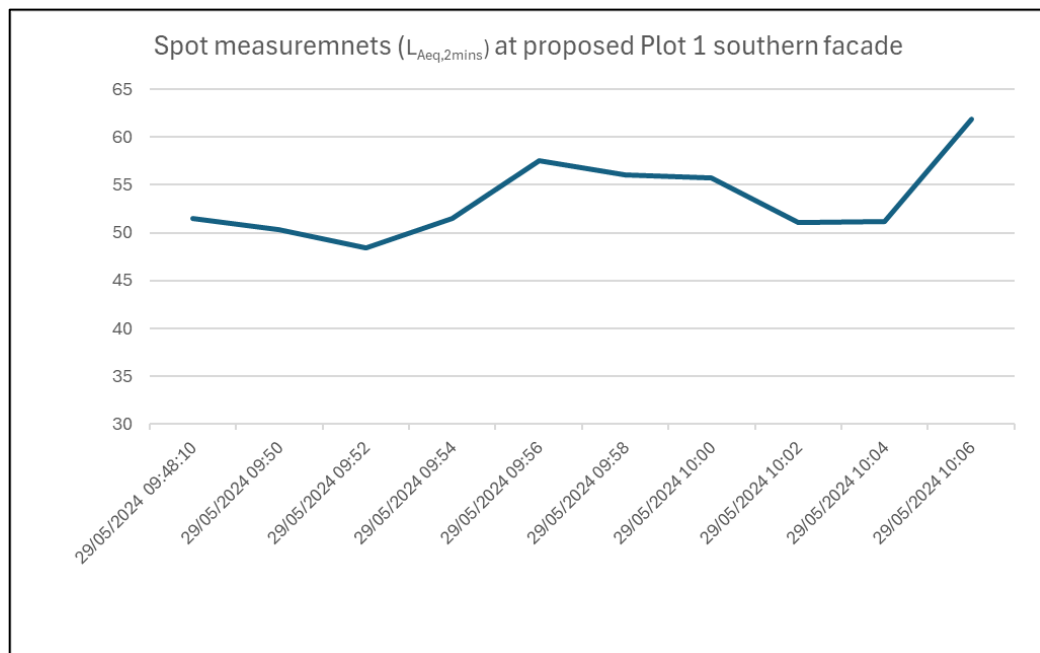


Diagram 4 – level vs time history – MP3

- 4.7 Given the monitoring position and the measurements obtained, it is possible to calculate representative $L_{Aeq, T}$ values experienced during the day and night-time periods.
- 4.8 For the purposes of this report and in line with the recommendation of BS8233, the following time periods have been calculated.
- (a) 07:00 hrs to 23:00 hrs for living rooms.
 - (b) 23:00 hrs to 07:00 hrs for bedrooms.
- 4.9 The measurements are based on the day and night time period $L_{Aeq,2min}$ and $L_{Amax,2mins}$ measurements obtained during the assessment period at the front and rear of the site. The results obtained are detailed below.

Location	Daytime 07:00 to 23:00	Night time 23:00 to 07:00	10 th highest L_{Amax} dB
MP1	50	46	71 ¹
MP2	57	51	73

Table 2

¹ From the data, the 10th highest $L_{Amax,F}$ measurement during the night time period at the façade has been considered, this is taken from WHO Guidelines for Community Noise – which states “For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night” (Vallet and Vernet 1991).

- 4.10 The spot measurements obtained at MP3 are detailed below along with a comparison of the measurements obtained at MP2 during the same time period.

Location	Period	L _{Aeq} , dB
MP2	09:46 to 10:08	56
MP3		56

Table 3

- 4.11 It is evident that there is no need to correct the measurements obtained for MP3 and that the measured noise levels obtained at MP2 are indicative of the noise climate that will be experienced by the new detached dwelling identified as Plot 1.
- 4.12 The measurements obtained at MP2 will be used within the calculation exercises to determine the required façade insulation requirements for the habitable spaces within Plot 1.

5. EQUIPMENT

- 5.1 All measurements were obtained using the following equipment:
- Svantek Precision Sound Level Meter Type Svan 971, Serial No. 51704
 - Norsonic Precision Sound Level Meter Type Nor-140, Serial No. 1403466
 - Rion Precision Sound Level Meter Type NA-28 Serial No. 00370311
 - Rion Calibrator Type NC-74 Class 1, Serial No. 00410215
- 5.2 The relevant equipment carries full and current traceable calibration.
- 5.3 The equipment, where necessary, was calibrated prior to and after the measurements were carried out.

6. BUILDING ENVELOPE RECOMMENDATIONS

- 6.1 It is recommended that in order to meet the LPA requirements, acoustic fenestration measures be considered in order to protect the daytime and night-time amenity of future occupiers. It is understood that passive ventilation is to be provided to the new residential dwellings and so passive/trickle ventilation elements will need to be included within the calculation exercises.
- 6.2 To reduce daytime and night-time noise exposure in the proposed dwellings, attention should be given to the sound insulation of the façade of the building. The windows will normally be the weakest part of any façade.

- 6.3 Based on the information supplied, it is anticipated the wall and roof constructions to be used onsite will have insulation values as detailed in Table 4 below. These performance values were obtained from proprietary prediction software 'Insul' written by Marshall Day, the values predicted have been corrected to account for workmanship, onsite installation and to account for the differences between lightweight and heavyweight construction systems.

Construction	Insulation value	Prediction correction
Plot 1 external wall (new brick block cavity)	R _w 58	-4dB
Plot 1 roof (new pitched roof)	R _w 56	-7dB
Plots 2-9 external wall (existing cavity wall)	R _w 54	-4dB
Plots 2-9 roof (existing pitched roof)	R _w 56	-7dB

Table 4

- 6.4 A copy of the prediction outputs for the noted constructions are contained within Appendix A of this report. Given the external noise levels it is essential that the glazing performances as calculated are met. This will provide the necessary sound insulation values to reduce the internal noise levels to an acceptable level.
- 6.5 If the constructions were to be revised, the performance values should be checked prior to the change of use, to ensure the internal noise level requirements of BS8233:2014 are still met.
- 6.6 From the calculated levels it is possible to predict the internal noise levels within habitable rooms. In order to undertake this, consideration has been given to the following formula:

$$SPL_{in} = SPL_{out} + 10\log_{10} \left(\frac{A_0}{S} 10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S} 10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{\frac{-R_{ew}}{10}} + \frac{S}{A} \right) + 3$$

where:

SPL _{in} =	sound pressure level inside the room
SPL _{out} =	highest sound pressure level outside the room
A ₀ =	reference absorption area of 10m ²
S _{wi} =	area in m ² of the windows of the room
S _{ew} =	area in m ² of the external wall of the room
R _{wi} =	weighted sound reduction index of window (R _w +C _{tr})
R _{ew} =	weighted sound reduction index of external wall
S =	area through which sound is transmitted (m ²)
A =	amount of acoustic absorption in room (m ²)
K =	a numerical factor associated with sound incidence

Equation 1

- 6.7 Room dimensions and the size of windows have been extracted from scaled drawings. For the purposes of the calculation exercises, a typical example of the accommodation proposed at various levels with different roof constructions has been assessed.
- 6.8 Due to the varying methods of quantifying the sound insulation performance of building elements, the following parameters are described:
- R_w Weighted Sound Reduction Index: Single figure sound insulation value derived from the measured sound reduction index R.*

- 6.9 To meet the criteria, Equation 1 was rearranged in terms of R_w (the sound reduction index of the window). The window specification required in order to achieve the internal noise levels as set out in BS8233 are shown in Table 5. Details of the elements within the calculation exercises are contained within Appendix B of this report.

Accommodation	Sound Reduction Index (R_w)	$D_{n,e,w}$ (dB)
Plot 1 - All habitable rooms	34	33
Plots 2-9 – All habitable rooms	31 ²	38

Table 5

- 6.10 To achieve the values of R_w as specified in Table 5, a number of glazing systems were reviewed. The required window performance can be achieved using the following glazing configuration (taken from Guardian Glass and Insul):

Required window performance	Glazing configuration (example)
Plot 1 habitable rooms 34dB R_w	6mm float glass 10mm cavity 4mm Float glass
Plots 2-9 habitable rooms 31dB R_w	Existing 6mm float glass

Table 6

- 6.11 To achieve the $D_{n,e,w}$, as specified in Table 5, a Simon Acoustics frame vent ($D_{n,e,w}$ 33dB) wall vent was chosen for the new detached building (Plot 1), for Plots 2-9 a Rytons TAL4H&M ($D_{n,e,w}$ 38dB) through wall vent was assessed. Other wall/frame vents with equal or better performance are available. For the benefit of the calculation exercise 2No. vents were used for a living space and 1no. vent for the bedroom spaces.
- 6.12 Suggested window specifications are detailed in Appendix C. This glass has published performance data. The published performance figures for the 'glass only' were obtained from laboratory measurements. The best workmanship practices and installation guidelines should be followed to ensure that the stated performances can be obtained once installed within a frame.
- 6.13 Alternatively, a window system (glass and frame) matching or exceeding the octave band performances detailed within the calculation exercises (Appendix B) would be acceptable, the minimum octave band performance levels required for any window system (glass and frame) are confirmed below in Table 7.

Minimum performance requirements	SRI Octave Band Centre Frequency (Hz)								R_w
	63	125	250	500	1k	2k	4k	8k	
34dB R_w	-	27	26	28	37	36	29	-	34
31dB R_w	-	21	25	29	33	31	35	-	31

Table 7

² R_w 31dB assumed performance from existing 6mm float glass within windows of existing building located at 11 Glebe Road, copy of Insul prediction datasheet contained within Appendix C.

VENTILATION

6.14 Ventilation requirements for dwellings (and other buildings) are covered under the Building Regulations 'Approved Document F – Means of Ventilation, 2010 Volume 1:Dwellings (ADF).

6.15 ADF requires that:

“There shall be adequate means of ventilation provided for people in the building”.

6.16 Ventilation is required for the following purposes:

- (a) *Extracts water vapour and indoor pollutants from areas where they are produced in significant quantities.*
- (b) *Supplies a minimum level of outdoor air for occupants' health.*
- (c) *Rapidly dilutes indoor air pollutants and disperses water vapour when necessary.*

6.17 ADF describes three types of ventilation provision and associated use. The types of ventilation are summarised below:

Type of ventilation	Location	When is this required
Extract Ventilation	Kitchens Utility rooms Bathrooms Sanitary accommodation	Continuous or Intermittent
Whole Dwelling Ventilation	All habitable rooms	Continuously
Purge Ventilation	All habitable rooms	Occasionally

Table 8

6.18 It is currently proposed to install 'natural / passive vents to habitable rooms & extract ventilation to kitchens, bathrooms & sanitary accommodation to all residential units. This background ventilation provision is to avoid having to open windows.

6.19 In addition to the above ADF also states:

“Purge ventilation should be capable of extracting at least four air changes per hour per room directly to the outside.”

6.20 If required to demonstrate compliance with Part O of the Building Regulations, it is likely that higher purge ventilation rates than those given above will be required.

7. CONCLUSION

7.1 With regard to the proposed development, it can be concluded that:

“The general noise climate was dominated by existing road traffic noise sources.”

7.2 Based on the foregoing building envelope assessment, it can be concluded that:

- (a) *Glazing systems with the appropriate acoustic performance (Table 5) would provide sufficient attenuation from noise levels generated from the adjacent highways/commercial activities and reduce internal noise levels to meet the levels stated within ProPG, BS 8233:2014 and WHO guidelines for Community Noise.*
- (b) *The level of sound insulation needed to enable the internal noise level requirements to be met is based on the building envelope constructions as detailed (Table 4).*
- (c) *Natural/passive ventilation is proposed for the residential units to provide adequate background ventilation and to avoid having to open windows. Ventilators with the relevant acoustic performance (Table 5) would provide sufficient attenuation to reduce internal noise levels to meet the minimum requirements recommended within ProPG, BS8233:2014 and World Health Organisation (WHO) guidelines.*

7.3 Glazing and ventilation mitigation measure details have been provided to enable the recommended internal noise levels provided within BS 8233:2014 to be met with the windows closed.

7.4 It is recommended that once the chosen window supplier is confirmed, the chosen glazing system should be checked by a suitably qualified person to ensure that the recommended minimum performances can be obtained once installed.

Figures

11 Glebe Road, Reading, RG2 7AG and surrounding area



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8

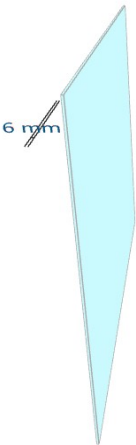
Appendix A

Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within $R_w \pm 3$ dB
- Key No. 2501
Job Name:
Job No.:
Date:18/06/2024
File Name:insul

Initials:Andre

Notes:



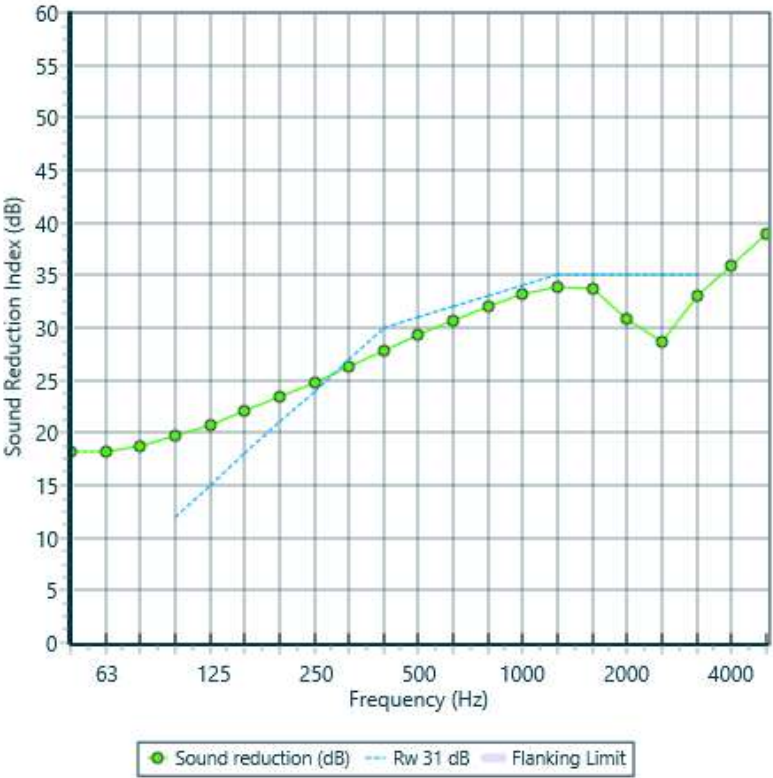
R_w 31 dB
C -1 dB
Ctr -2 dB

Panel Size = 2.0 m x 1.5 m
Partition surface mass = 14.6 kg/m²

System description

Pane 1 : 1 x 6 mm Glass

freq.(Hz)	R(dB)	R(dB)
50	18	
63	18	18
80	19	
100	20	
125	21	21
160	22	
200	23	
250	25	25
315	26	
400	28	
500	29	29
630	31	
800	32	
1000	33	33
1250	34	
1600	34	
2000	31	31
2500	29	
3150	33	
4000	36	35
5000	39	



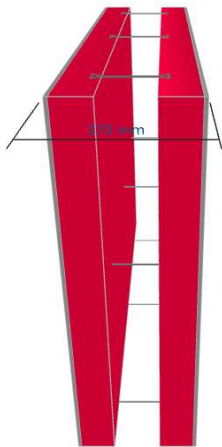
Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within $R_w \pm 3$ dB
- Key No. 2501
Job Name: 11 Glebe Road
Job No.: 104614
Date:18/06/2024
File Name:Insul plot 1 existing external wall.ixl

Initials:AD



Notes:existing external wall



Rw 54 dB

C0 dB

Ctr-3 dB

Mass-air-mass resonant frequency = -16 Hz
Panel Size = 2.7 m x 4.0 m
Partition surface mass = 361 kg/m²

System description

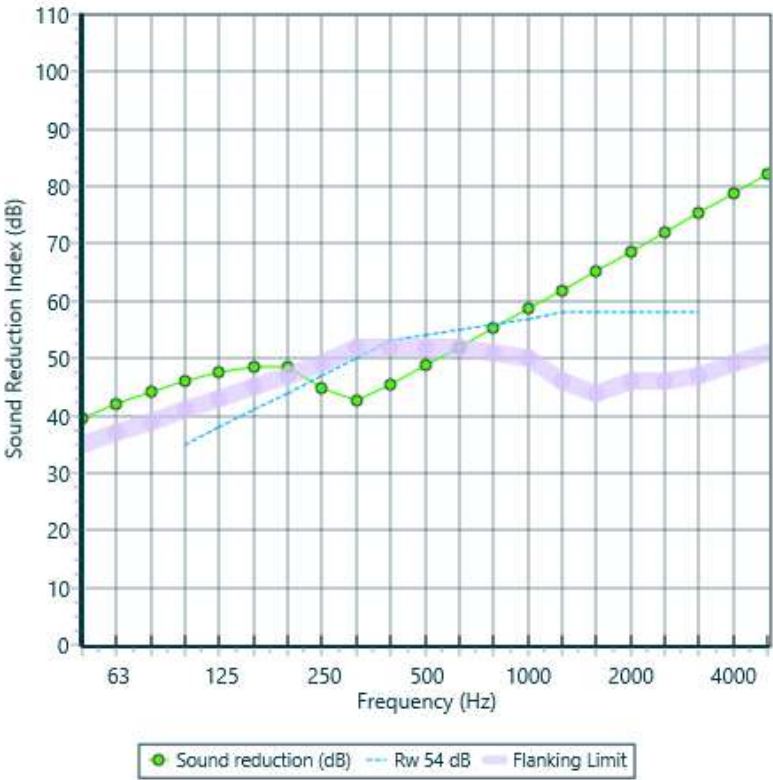
- Panel 1 : 1 x 10 mm Sand/Cement render (plaster)

+ 1 x 102.5 mm Brick
- Frame: Butterfly Tie (1.4E2 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 145 mm

Panel 2 : 1 x 102.5 mm Brick

+ 1 x 10 mm Sand/Cement render (plaster)

freq.(Hz)	R(dB)	R(dB)
50	40	
63	42	41
80	44	
100	46	
125	48	47
160	49	
200	49	
250	45	45
315	43	
400	46	
500	49	48
630	52	
800	55	
1000	59	58
1250	62	
1600	65	
2000	69	68
2500	72	
3150	75	
4000	79	78
5000	82	



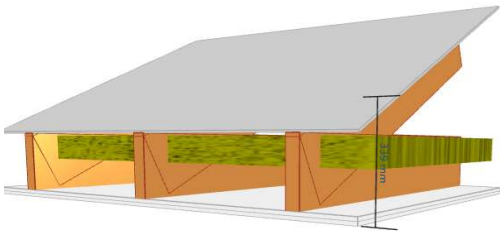
Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within $R_w \pm 3$ dB
- Key No. 2501
Job Name:11 Glebe Road
Job No.:104614
Date:18/06/2024
File Name:Insul existing building pitched roof.ixl

Initials:AD



Notes:existing building pitched roof



Rw 56 dB

C-1 dB

Ctr-5 dB

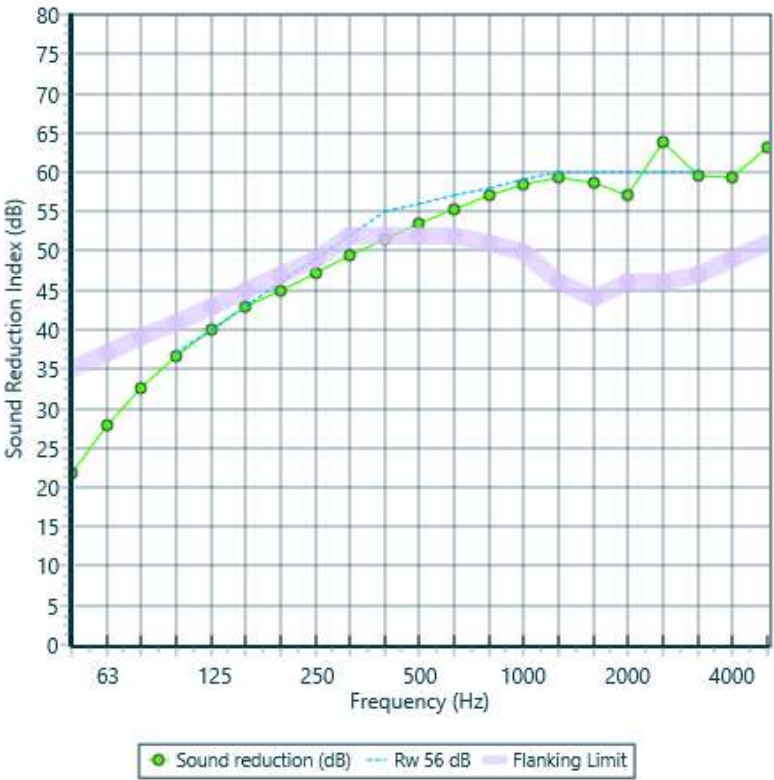
Mass-air-mass resonant frequency = 31 Hz
Panel Size = 2.7 m x 4.0 m
Partition surface mass = 37.4 kg/m²

System description

Panel 1 : 1 x 7 mm Roofing Slates

Frame: Pitched Roof (2.2E2 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 306.7 mm , 1 x Fibreglass (10kg/m3) Thickness 100 mm
Panel 2 : 2 x 12.5 mm Gyproc Wallboard 12.5mm

freq.(Hz)	R(dB)	R(dB)
50	22	
63	28	25
80	33	
100	37	
125	40	39
160	43	
200	45	
250	47	47
315	49	
400	52	
500	54	53
630	55	
800	57	
1000	58	58
1250	59	
1600	59	
2000	57	59
2500	64	
3150	59	
4000	59	60
5000	63	



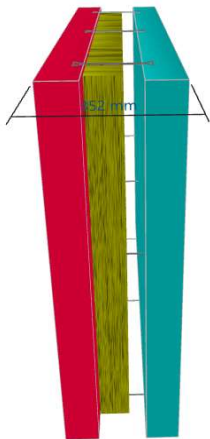
Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within $R_w \pm 3$ dB
- Key No. 2501
Job Name: 11 Glebe Road
Job No.: 104614
Date:17/06/2024
File Name:Insul plot 1 external wall.ixl

Initials:AD



Notes:Plot 1 house external wall



R_w 58 dB
C -1 dB
Ctr -4 dB

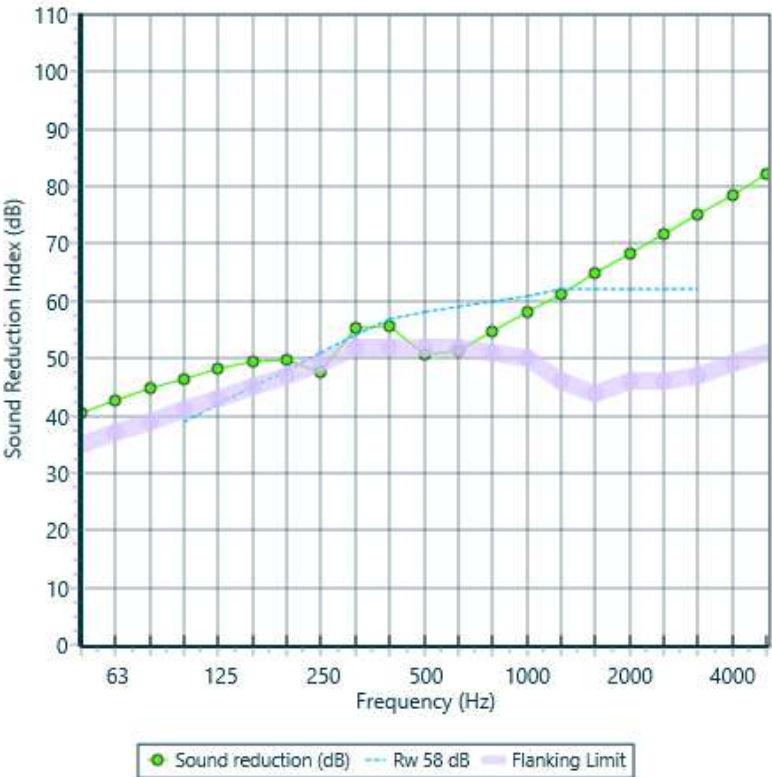
Mass-air-mass resonant frequency = 15 Hz
Panel Size = 2.7 m x 4.0 m
Partition surface mass = 305 kg/m²

System description

Panel 1 : 1 x 102.5 mm Brick

Frame: Butterfly Tie (1.5E2 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 150 mm , 1 x Fibreglass (10kg/m3) Thickness 100 mm
Panel 2 : 1 x 100 mm Medium Density Blockwork

freq.(Hz)	R(dB)	R(dB)
50	41	
63	43	42
80	45	
100	46	
125	48	48
160	49	
200	50	
250	48	50
315	55	
400	56	
500	51	52
630	51	
800	55	
1000	58	57
1250	61	
1600	65	
2000	68	67
2500	72	
3150	75	
4000	79	78
5000	82	



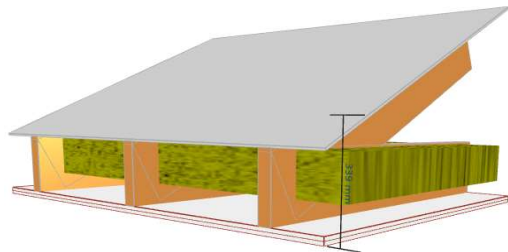
Sound Insulation Prediction (v9.0.24)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within $R_w \pm 3$ dB
- Key No. 2501
Job Name:11 Glebe Road
Job No.:104614
Date:17/06/2024
File Name:Insul plot 1 pitched roof.ixl

Initials:AD



Notes:plot 1 pitched roof



Rw 56 dB

C -1 dB

Ctr -4 dB

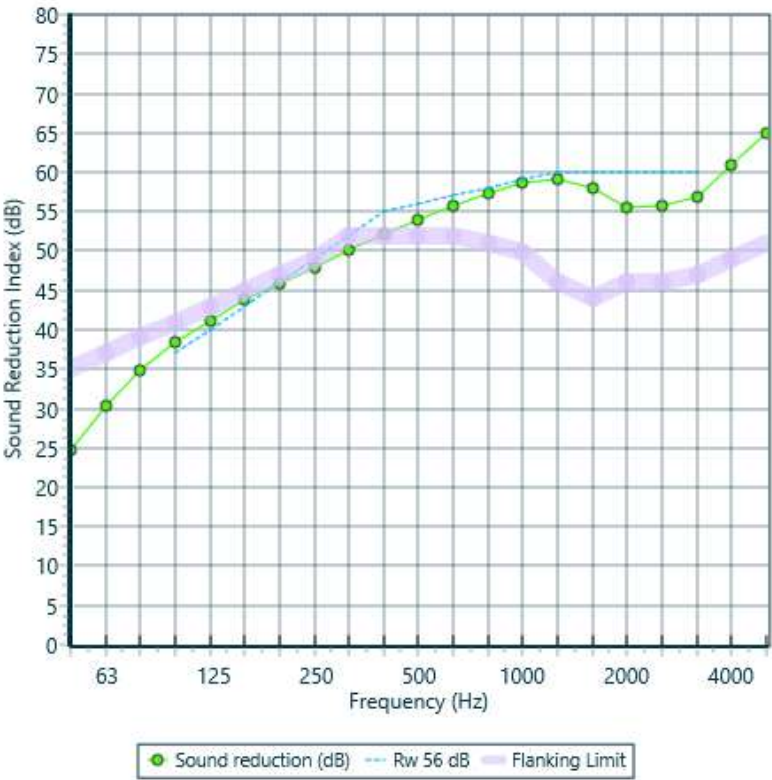
Mass-air-mass resonant frequency = -29 Hz
Panel Size = 2.7 m x 4.0 m
Partition surface mass = 43.1 kg/m²

System description

Panel 1 : 1 x 7 mm Roofing Slates

Frame: Pitched Roof (2.2E2 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 306.9 mm , 1 x Fibreglass (10kg/m3) Thickness 150 mm
Panel 2 : 2 x 12.5 mm Gyproc SoundBloc 12.5mm

freq.(Hz)	R(dB)	R(dB)
50	25	
63	30	28
80	35	
100	38	
125	41	41
160	44	
200	46	
250	48	48
315	50	
400	52	
500	54	54
630	56	
800	57	
1000	59	58
1250	59	
1600	58	
2000	56	56
2500	56	
3150	57	
4000	61	60
5000	65	



Appendix B

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Passive vents - 2No. Simon acoustic FV vents	$D_{ne,w}$	Dne,w 33dB	36	33	32	28	29	34	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.75	4	6	8	8	7	7	

Derivation	Term	Value
Façade area (including window)	S_f	20
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	16
Area of ceiling	S_{rr}	16
$S_f + S_{rr}$	S	35
Reference absorption area	A_0	10
Room volume	V	39

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Passive vents - 2No. Simon acoustic FV vents	$D_{n,e}$ $(A_0/S) * 10^{(-D_{ne,w}/10)}$		36.48970004	32.88970004	32.08970004	27.68970004	29.08970004	33.88970004	
Double Glazed Windows	R_{wi} $(S_{wi}/S) * 10^{(-R_{wi}/10)}$	B	0.00006	0.00015	0.00017	0.00048	0.00035	0.00012	
External Wall Construction	R_{ew} $(S_{ew}/S) * 10^{(-R_{ew}/10)}$	C	0.00019	0.00024	0.00015	0.00002	0.00002	0.00012	
Roof Construction	R_{rr} $(S_{rr}/S) * 10^{(-R_{rr}/10)}$	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Absorption Area of Receiver Room	A (furnished) $10 \log(S/A)$	F	-36	-34	-35	-33	-34	-36	
Total Internal Sound Pressure Level, Leq	Leq,2	G	4	6	8	8	7	7	
		A+F+G+3	9.0	7.4	6.2	6.2	6.7	6.7	
			35.3	30.6	28.0	30.0	23.8	16.2	

RESULTANT INTERNAL NOISE LEVEL	33
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.5	2	4	6	6	5	5	

Derivation	Term	Value
Façade area (including window)	S_f	14
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	12
Area of ceiling	S_{rr}	7
$S_f + S_{rr}$	S	21
Reference absorption area	A_0	10
Room volume	V	18

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00005	0.00012	0.00015	0.00041	0.00029	0.00010	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00017	0.00022	0.00014	0.00002	0.00002	0.00011	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-36	-35	-35	-34	-35	-37	
Total Absorption Area of Receiver Room	A (furnished)		2	4	6	6	5	5	
	$10\text{Log}(S/A)$	G	10.9	7.5	5.7	5.7	6.5	6.5	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	36.8	30.3	27.0	28.7	22.8	15.4	

RESULTANT INTERNAL NOISE LEVEL	32
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43
Passive vents - 2No. Simon acoustic FV vents	$D_{ne,w}$	Dne,w 33dB	36	33	32	28	29	34
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100
Total room absorption (based on RT)	RT ₆₀	0.75	6	8	10	10	9	9

Derivation	Term	Value
Façade area (including window)	S_f	23
Window area	S_{wi}	8
$S_f - S_{wi}$	S_{ew}	15
Area of ceiling	S_{rr}	19
$S_f + S_{rr}$	S	42
Reference absorption area	A_0	10
Room volume	V	48

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43
Passive vents - 2No. Simon acoustic FV vents	$D_{n,e}$ $(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	36.48970004	32.88970004	32.08970004	27.68970004	29.08970004	33.88970004
Double Glazed Windows	R_{wi} $(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00005	0.00012	0.00015	0.00040	0.00029	0.00010
External Wall Construction	R_{ew} $(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00040	0.00050	0.00031	0.00004	0.00005	0.00025
Roof Construction	R_{rr} $(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-33	-32	-33	-34	-35	-35
Total Absorption Area of Receiver Room	A (furnished) $10\text{Log}(S/A)$	G	6	8	10	10	9	9
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	36.8	32.2	29.4	29.3	23.2	17.6

RESULTANT INTERNAL NOISE LEVEL	33
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43
Passive vents - 2No. Simon acoustic FV vents	$D_{ne,w}$	Dne,w 33dB	36	33	32	28	29	34
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100
Total room absorption (based on RT)	RT ₆₀	0.75	13	15	17	17	16	16

Derivation	Term	Value
Façade area (including window)	S_f	17
Window area	S_{wi}	6
$S_f - S_{wi}$	S_{ew}	10
Area of ceiling	S_{rr}	31
$S_f + S_{rr}$	S	48
Reference absorption area	A_0	10
Room volume	V	78

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43
Passive vents - 2No. Simon acoustic FV vents	$D_{n,e}$ $(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	36.48970004	32.88970004	32.08970004	27.68970004	29.08970004	33.88970004
Double Glazed Windows	R_{wi} $(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00005	0.00011	0.00013	0.00036	0.00026	0.00009
External Wall Construction	R_{ew} $(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00026	0.00033	0.00021	0.00003	0.00003	0.00017
Roof Construction	R_{rr} $(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	44	46	48	53	63	74
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	0.00001	0.00001	0.00000	0.00000	0.00000	0.00000
Total Absorption Area of Receiver Room	A (furnished)	G	100	100	100	100	100	100
Total Internal Sound Pressure Level, Leq	$10\text{Log}(S/A)$ Leq,2	A+F+G+3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
			32.7	28.8	26.5	27.1	20.8	14.5

RESULTANT INTERNAL NOISE LEVEL	30
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R_w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT_{60}	0.5	6	8	10	10	9	9	

Derivation	Term	Value
Façade area (including window)	S_f	19
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	16
Area of ceiling	S_{rr}	13
$S_f + S_{rr}$	S	32
Reference absorption area	A_0	10
Room volume	V	32

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00004	0.00008	0.00010	0.00027	0.00020	0.00006	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00021	0.00027	0.00017	0.00002	0.00003	0.00013	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00016	0.00003	0.00001	0.00000	0.00001	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-34	-34	-35	-35	-36	-37	
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9	
	$10\text{Log}(S/A)$	G	7.0	5.8	4.9	4.9	5.3	5.3	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	35.3	29.0	26.0	26.4	20.2	14.1	

RESULTANT INTERNAL NOISE LEVEL	30
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	51dBA	53	48	47	46	41	44	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R_w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT_{60}	0.5	6	8	10	10	9	9	

Derivation	Term	Value
Façade area (including window)	S_f	19
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	16
Area of ceiling	S_{rr}	13
$S_f + S_{rr}$	S	32
Reference absorption area	A_0	10
Room volume	V	32

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	53	48	47	46	41	44	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00004	0.00008	0.00010	0.00027	0.00020	0.00006	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00021	0.00027	0.00017	0.00002	0.00003	0.00013	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00016	0.00003	0.00001	0.00000	0.00001	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-34	-34	-35	-35	-36	-37	
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9	
	$10\text{Log}(S/A)$	G	7.0	5.8	4.9	4.9	5.3	5.3	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	29.0	22.9	19.5	18.7	13.0	15.6	

RESULTANT INTERNAL NOISE LEVEL	24
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{max,ff}$	73dBA	69	59	61	65	56	71	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R_w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT_{60}	0.5	6	8	10	10	9	9	

Derivation	Term	Value
Façade area (including window)	S_f	19
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	16
Area of ceiling	S_{rr}	13
$S_f + S_{rr}$	S	32
Reference absorption area	A_0	10
Room volume	V	32

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	69	59	61	65	56	71	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00004	0.00008	0.00010	0.00027	0.00020	0.00006	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00021	0.00027	0.00017	0.00002	0.00003	0.00013	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_r/S)*10^{(-R_{rr}/10)}$	E	0.00016	0.00003	0.00001	0.00000	0.00001	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-34	-34	-35	-35	-36	-37	
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9	
	$10\text{Log}(S/A)$	G	7.0	5.8	4.9	4.9	5.3	5.3	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	45.4	33.9	33.6	37.1	27.9	42.6	

RESULTANT INTERNAL NOISE LEVEL	44
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R_w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT_{60}	0.5	11	13	15	15	14	14	

Derivation	Term	Value
Façade area (including window)	S_f	22
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	19
Area of ceiling	S_{rr}	18
$S_f + S_{rr}$	S	40
Reference absorption area	A_0	10
Room volume	V	45

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00003	0.00006	0.00008	0.00021	0.00016	0.00005	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00012	0.00015	0.00010	0.00001	0.00002	0.00008	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00018	0.00004	0.00001	0.00000	0.00001	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-35	-36	-37	-36	-38	-39	
Total Absorption Area of Receiver Room	A (furnished)		11	13	15	15	14	14	
	$10\text{Log}(S/A)$	G	5.7	5.0	4.3	4.3	4.7	4.7	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	33.1	26.4	23.8	24.8	18.5	11.5	

RESULTANT INTERNAL NOISE LEVEL	28
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	51dBA	53	48	47	46	41	44	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R_w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT_{60}	0.5	11	13	15	15	14	14	

Derivation	Term	Value
Façade area (including window)	S_f	22
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	19
Area of ceiling	S_{rr}	18
$S_f + S_{rr}$	S	40
Reference absorption area	A_0	10
Room volume	V	45

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	53	48	47	46	41	44	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00003	0.00006	0.00008	0.00021	0.00016	0.00005	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00012	0.00015	0.00010	0.00001	0.00002	0.00008	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00018	0.00004	0.00001	0.00000	0.00001	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-35	-36	-37	-36	-38	-39	
Total Absorption Area of Receiver Room	A (furnished)		11	13	15	15	14	14	
	$10\text{Log}(S/A)$	G	5.7	5.0	4.3	4.3	4.7	4.7	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	26.8	20.3	17.2	17.2	11.2	13.1	

RESULTANT INTERNAL NOISE LEVEL	22
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	L _{max,ff}	73dBA	69	59	61	65	56	71	
Simon Acoustic frame ventilator	D _{ne,w}	D _{ne,w} 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R _w	R _w 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R _{ew}	R _w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R _{rr}	R _w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT ₆₀	0.5	11	13	15	15	14	14	

Derivation	Term	Value
Façade area (including window)	S _f	22
Window area	S _{wi}	2
S _f -S _{wi}	S _{ew}	19
Area of ceiling	S _{rr}	18
S _f +S _{rr}	S	40
Reference absorption area	A ₀	10
Room volume	V	45

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	L _{eq,ff}	A	69	59	61	65	56	71	
Simon Acoustic frame ventilator	D _{n,e}		39.5	35.9	35.1	30.7	32.1	36.9	
	(A ₀ /S)*10 [^] (-D _{ne,w} /10)	B	0.00003	0.00006	0.00008	0.00021	0.00016	0.00005	
Double Glazed Windows	R _{wi}		27	26	28	37	36	29	
	(S _{wi} /S)*10 [^] (-R _{wi} /10)	C	0.00012	0.00015	0.00010	0.00001	0.00002	0.00008	
External Wall Construction	R _{ew}		44	46	48	53	63	74	
	(S _{ew} /S)*10 [^] (-R _{ew} /10)	D	0.00002	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R _{rr}		34	41	47	51	49	53	
	(S _{rr} /S)*10 [^] (-R _{rr} /10)	E	0.00018	0.00004	0.00001	0.00000	0.00001	0.00000	
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-35	-36	-37	-36	-38	-39	
Total Absorption Area of Receiver Room	A (furnished)		11	13	15	15	14	14	
	10Log(S/A)	G	5.7	5.0	4.3	4.3	4.7	4.7	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	43.2	31.4	31.3	35.6	26.1	40.0	

RESULTANT INTERNAL NOISE LEVEL	42
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R _w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R _w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT ₆₀	0.5	3	5	7	7	6	6	

Derivation	Term	Value
Façade area (including window)	S_f	16
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	14
Area of ceiling	S_{rr}	8
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	20

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00005	0.00011	0.00013	0.00036	0.00026	0.00009	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00011	0.00014	0.00009	0.00001	0.00001	0.00007	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00013	0.00003	0.00001	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-35	-35	-36	-34	-36	-38	
Total Absorption Area of Receiver Room	A (furnished)		3	5	7	7	6	6	
	$10\text{Log}(S/A)$	G	9.7	7.2	5.6	5.6	6.3	6.3	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	36.7	29.0	25.9	28.1	22.1	14.0	

RESULTANT INTERNAL NOISE LEVEL	31
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	51dBA	53	48	47	46	41	44	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R_w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R_w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT_{60}	0.5	3	5	7	7	6	6	

Derivation	Term	Value
Façade area (including window)	S_f	16
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	14
Area of ceiling	S_{rr}	8
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	20

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	53	48	47	46	41	44	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00005	0.00011	0.00013	0.00036	0.00026	0.00009	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00011	0.00014	0.00009	0.00001	0.00001	0.00007	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00013	0.00003	0.00001	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-35	-35	-36	-34	-36	-38	
Total Absorption Area of Receiver Room	A (furnished)		3	5	7	7	6	6	
	$10\text{Log}(S/A)$	G	9.7	7.2	5.6	5.6	6.3	6.3	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	30.4	22.9	19.4	20.5	14.9	15.6	

RESULTANT INTERNAL NOISE LEVEL	25
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{max,ff}$	73dBA	69	59	61	65	56	71	
Simon Acoustic frame ventilator	$D_{ne,w}$	Dne,w 33dB	40	36	35	31	32	37	
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29	
External wall - blockwork cavity	R_{ew}	R _w 58dB	44	46	48	53	63	74	
Roof - Pitched roof	R_{rr}	R _w 56 dB	34	41	47	51	49	53	
Total room absorption (based on RT)	RT_{60}	0.5	3	5	7	7	6	6	

Derivation	Term	Value
Façade area (including window)	S_f	16
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	14
Area of ceiling	S_{rr}	8
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	20

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	69	59	61	65	56	71	
Simon Acoustic frame ventilator	$D_{n,e}$		39.5	35.9	35.1	30.7	32.1	36.9	
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00005	0.00011	0.00013	0.00036	0.00026	0.00009	
Double Glazed Windows	R_{wi}		27	26	28	37	36	29	
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00011	0.00014	0.00009	0.00001	0.00001	0.00007	
External Wall Construction	R_{ew}		44	46	48	53	63	74	
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		34	41	47	51	49	53	
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00013	0.00003	0.00001	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-35	-35	-36	-34	-36	-38	
Total Absorption Area of Receiver Room	A (furnished)		3	5	7	7	6	6	
	$10\text{Log}(S/A)$	G	9.7	7.2	5.6	5.6	6.3	6.3	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	46.8	34.0	33.5	38.9	29.7	42.5	

RESULTANT INTERNAL NOISE LEVEL	45
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43
2no. Rytons TAL4H&M airliner brick vents	$D_{ne,w}$	Dne,w 38dB	44	44	37	39	42	47
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100
Total room absorption (based on RT)	RT_{60}	0.75	7	9	11	11	10	10

Derivation	Term	Value
Façade area (including window)	S_f	26
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	23
Area of ceiling	S_{rr}	21
$S_f + S_{rr}$	S	47
Reference absorption area	A_0	10
Room volume	V	53

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)							
			125	250	500	1000	2000	4000		
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43		
2no. Rytons TAL4H&M airliner brick vents	$D_{n,e}$ $(A_0/S) * 10^{(-D_{ne,w}/10)}$		44.38970004	44.08970004	37.48970004	39.08970004	41.78970004	46.58970004		
Double Glazed Windows	R_{wi} $(S_{wi}/S) * 10^{(-R_{wi}/10)}$	B	0.00001	0.00001	0.00004	0.00003	0.00001	0.00000		
External Wall Construction	R_{ew} $(S_{ew}/S) * 10^{(-R_{ew}/10)}$	C	0.00035	0.00014	0.00006	0.00002	0.00004	0.00001		
Roof Construction	R_{rr} $(S_{rr}/S) * 10^{(-R_{rr}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000		
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000		
Total Absorption Area of Receiver Room	A (furnished)	F	-34	-37	-39	-43	-43	-47		
Total Internal Sound Pressure Level, Leq	$10 \log(S/A)$	G	7	9	11	11	10	10		
	$Leq,2$	A+F+G+3	8.0	6.9	6.1	6.1	6.5	6.5		
			35.8	26.9	23.3	19.9	14.8	5.0		

RESULTANT INTERNAL NOISE LEVEL	26
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.5	8	10	12	12	11	11	

Derivation	Term	Value
Façade area (including window)	S_f	20
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	17
Area of ceiling	S_{rr}	14
$S_f + S_{rr}$	S	34
Reference absorption area	A_0	10
Room volume	V	36

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00061	0.00024	0.00010	0.00004	0.00006	0.00002	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	F	-32	-35	-38	-42	-41	-46	
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11	
	$10 \log(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	36.6	27.4	22.9	19.1	14.9	5.2	

RESULTANT INTERNAL NOISE LEVEL	26
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	51dBA	53	48	47	46	41	44	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.5	8	10	12	12	11	11	

Derivation	Term	Value
Façade area (including window)	S_f	20
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	17
Area of ceiling	S_{rr}	14
$S_f + S_{rr}$	S	34
Reference absorption area	A_0	10
Room volume	V	36

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	53	48	47	46	41	44	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00061	0.00024	0.00010	0.00004	0.00006	0.00002	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_r/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-32	-35	-38	-42	-41	-46	
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11	
	$10\text{Log}(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	30.3	21.2	16.4	11.5	7.7	6.8	

RESULTANT INTERNAL NOISE LEVEL	20
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{max,ff}$	73dBA	69	59	61	65	56	71	
Ryttons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT_{60}	0.5	8	10	12	12	11	11	

Derivation	Term	Value
Façade area (including window)	S_f	20
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	17
Area of ceiling	S_{rr}	14
$S_f + S_{rr}$	S	34
Reference absorption area	A_0	10
Room volume	V	36

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	69	59	61	65	56	71	
Ryttons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
Double Glazed Windows	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00061	0.00024	0.00010	0.00004	0.00006	0.00002	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-32	-35	-38	-42	-41	-46	
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11	
	$10\text{Log}(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	46.7	32.3	30.5	29.9	22.6	33.7	

RESULTANT INTERNAL NOISE LEVEL	37
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.5	4	6	8	8	7	7	

Derivation	Term	Value
Façade area (including window)	S_f	18
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	14
Area of ceiling	S_{rr}	10
$S_f + S_{rr}$	S	28
Reference absorption area	A_0	10
Room volume	V	26

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00100	0.00040	0.00016	0.00006	0.00010	0.00004	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-30	-34	-37	-41	-40	-44	
Total Absorption Area of Receiver Room	A (furnished)		4	6	8	8	7	7	
	$10\text{Log}(S/A)$	G	7.9	6.3	5.2	5.2	5.7	5.7	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	40.0	30.0	25.0	21.3	17.5	7.9	

RESULTANT INTERNAL NOISE LEVEL	29
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	51dBA	53	48	47	46	41	44	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.5	4	6	8	8	7	7	

Derivation	Term	Value
Façade area (including window)	S_f	18
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	14
Area of ceiling	S_{rr}	10
$S_f + S_{rr}$	S	28
Reference absorption area	A_0	10
Room volume	V	26

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	53	48	47	46	41	44	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00100	0.00040	0.00016	0.00006	0.00010	0.00004	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_r/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	F	-30	-34	-37	-41	-40	-44	
Total Absorption Area of Receiver Room	A (furnished)		4	6	8	8	7	7	
	$10 \log(S/A)$	G	7.9	6.3	5.2	5.2	5.7	5.7	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	33.7	23.9	18.5	13.7	10.3	9.4	

RESULTANT INTERNAL NOISE LEVEL	22
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{max,ff}$	73dBA	69	59	61	65	56	71	
Ryttons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT_{60}	0.5	4	6	8	8	7	7	

Derivation	Term	Value
Façade area (including window)	S_f	18
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	14
Area of ceiling	S_{rr}	10
$S_f + S_{rr}$	S	28
Reference absorption area	A_0	10
Room volume	V	26

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	69	59	61	65	56	71	
Ryttons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
Double Glazed Windows	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00100	0.00040	0.00016	0.00006	0.00010	0.00004	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10Log(B+C+D+E)$	F	-30	-34	-37	-41	-40	-44	
Total Absorption Area of Receiver Room	A (furnished)		4	6	8	8	7	7	
	$10Log(S/A)$	G	7.9	6.3	5.2	5.2	5.7	5.7	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	50.1	35.0	32.6	32.1	25.2	36.3	

RESULTANT INTERNAL NOISE LEVEL	40
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Rear	L _{eq,ff}	50dBA	54	50	45	46	41	35	
2no. Rytons TAL4H&M airliner brick vents	D _{ne,w}	Dne,w 38dB	44	44	37	39	42	47	
Insul 6mm float glass	R _w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R _{ew}	R _w 54dB	43	41	44	54	64	74	
Roof - not applicable	R _{rr}	R _w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.75	13	15	17	17	16	16	

Derivation	Term	Value
Façade area (including window)	S _f	30
Window area	S _{wi}	5
S _f -S _{wi}	S _{ew}	25
Area of ceiling	S _{rr}	31
S _f +S _{rr}	S	61
Reference absorption area	A ₀	10
Room volume	V	79

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	L _{eq,ff}	A	54	50	45	46	41	35	
2no. Rytons TAL4H&M airliner brick vents	D _{n,e} (A ₀ /S)*10 [^] (-D _{ne,w} /10)	B	44.38970004	44.08970004	37.48970004	39.08970004	41.78970004	46.58970004	
Double Glazed Windows	R _{wi} (S _{wi} /S)*10 [^] (-R _{wi} /10)	C	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
External Wall Construction	R _{ew} (S _{ew} /S)*10 [^] (-R _{ew} /10)	D	0.00058	0.00023	0.00009	0.00004	0.00006	0.00002	
Roof Construction	R _{rr} (S _{rr} /S)*10 [^] (-R _{rr} /10)	E	43	41	44	54	64	74	
Total Sound Insulation Performance	10Log(B+C+D+E)	F	0.00002	0.00003	0.00002	0.00000	0.00000	0.00000	
Total Absorption Area of Receiver Room	A (furnished) 10Log(S/A)	G	100	100	100	100	100	100	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	-32	-36	-39	-42	-42	-46	
			13	15	17	17	16	16	
			6.7	6.1	5.5	5.5	5.8	5.8	
			31.5	23.0	15.1	12.5	8.1	-1.7	

RESULTANT INTERNAL NOISE LEVEL	20
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)							
			125	250	500	1000	2000	4000		
Freefield External Noise Level - Rear	$L_{eq,ff}$	50dBA	54	50	45	46	41	35		
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50		
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35		
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74		
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100		
Total room absorption (based on RT)	RT ₆₀	0.5	8	10	12	12	11	11		

Derivation	Term	Value
Façade area (including window)	S_f	21
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	19
Area of ceiling	S_{rr}	15
$S_f + S_{rr}$	S	35
Reference absorption area	A_0	10
Room volume	V	37

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)							
			125	250	500	1000	2000	4000		
Freefield External Noise Level	$L_{eq,ff}$	A	54	50	45	46	41	35		
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6		
	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000		
Double Glazed Windows	R_{wi}		21	25	29	33	31	35		
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00034	0.00014	0.00005	0.00002	0.00003	0.00001		
External Wall Construction	R_{ew}		43	41	44	54	64	74		
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000		
Roof Construction	R_{rr}		100	100	100	100	100	100		
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000		
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	F	-34	-37	-40	-44	-44	-48		
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11		
	$10 \log(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1		
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	29.1	20.7	12.9	10.2	5.3	-4.5		

RESULTANT INTERNAL NOISE LEVEL	18
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Rear	$L_{eq,ff}$	46dBA	47	42	39	40	36	41	
Ryttons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT ₆₀	0.5	8	10	12	12	11	11	

Derivation	Term	Value
Façade area (including window)	S_f	21
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	19
Area of ceiling	S_{rr}	15
$S_f + S_{rr}$	S	35
Reference absorption area	A_0	10
Room volume	V	37

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	47	42	39	40	36	41	
Ryttons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00034	0.00014	0.00005	0.00002	0.00003	0.00001	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	F	-34	-37	-40	-44	-44	-48	
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11	
	$10 \log(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	22.1	12.9	6.6	4.2	0.4	1.3	

RESULTANT INTERNAL NOISE LEVEL	12
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Rear	$L_{max,ff}$	69dBA	58	54	55	53	48	68	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - not applicable	R_{rr}	R_w N/a dB	100	100	100	100	100	100	
Total room absorption (based on RT)	RT_{60}	0.5	8	10	12	12	11	11	

Derivation	Term	Value
Façade area (including window)	S_f	21
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	19
Area of ceiling	S_{rr}	15
$S_f + S_{rr}$	S	35
Reference absorption area	A_0	10
Room volume	V	37

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	58	54	55	53	48	68	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00034	0.00014	0.00005	0.00002	0.00003	0.00001	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		100	100	100	100	100	100	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	F	-34	-37	-40	-44	-44	-48	
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11	
	$10 \log(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	33.0	25.5	22.3	17.1	12.2	27.8	

RESULTANT INTERNAL NOISE LEVEL	29
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)							
			125	250	500	1000	2000	4000		
Freefield External Noise Level - Rear	$L_{eq,ff}$	50dBA	54	50	45	46	41	35		
2no. Rytons TAL4H&M airliner brick vents	$D_{ne,w}$	Dne,w 38dB	44	44	37	39	42	47		
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35		
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74		
Roof - pitched roof	R_{rr}	R_w 56 dB	32	40	46	51	52	53		
Total room absorption (based on RT)	RT_{60}	0.75	9	11	13	13	12	12		

Derivation	Term	Value
Façade area (including window)	S_f	7
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	6
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	37
Reference absorption area	A_0	10
Room volume	V	60

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)							
			125	250	500	1000	2000	4000		
Freefield External Noise Level	$L_{eq,ff}$	A	54	50	45	46	41	35		
2no. Rytons TAL4H&M airliner brick vents	$D_{n,e}$ $(A_0/S) * 10^{(-D_{ne,w}/10)}$		44.38970004	44.08970004	37.48970004	39.08970004	41.78970004	46.58970004		
Double Glazed Windows	R_{wi} $(S_{wi}/S) * 10^{(-R_{wi}/10)}$	B	0.00001	0.00001	0.00005	0.00003	0.00002	0.00001		
External Wall Construction	R_{ew} $(S_{ew}/S) * 10^{(-R_{ew}/10)}$	C	0.00015	0.00006	0.00002	0.00001	0.00002	0.00001		
Roof Construction	R_{rr} $(S_{rr}/S) * 10^{(-R_{rr}/10)}$	D	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000		
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	E	0.00052	0.00008	0.00002	0.00001	0.00001	0.00000		
Total Absorption Area of Receiver Room	A (furnished)	F	-32	-38	-40	-43	-44	-48		
Total Internal Sound Pressure Level, Leq	$10\text{Log}(S/A)$	G	9	11	13	13	12	12		
	$Leq,2$	A+F+G+3	6.1	5.2	4.5	4.5	4.8	4.8		
			31.4	19.9	12.7	10.8	4.5	-4.9		

RESULTANT INTERNAL NOISE LEVEL	19
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)							
			125	250	500	1000	2000	4000		
Freefield External Noise Level - Rear	$L_{eq,ff}$	50dBA	54	50	45	46	41	35		
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50		
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35		
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74		
Roof - pitched roof	R_{rr}	R_w 56 dB	32	40	46	51	52	53		
Total room absorption (based on RT)	RT_{60}	0.5	8	10	12	12	11	11		

Derivation	Term	Value
Façade area (including window)	S_f	21
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	19
Area of ceiling	S_{rr}	15
$S_f + S_{rr}$	S	35
Reference absorption area	A_0	10
Room volume	V	37

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)							
			125	250	500	1000	2000	4000		
Freefield External Noise Level	$L_{eq,ff}$	A	54	50	45	46	41	35		
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6		
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000		
Double Glazed Windows	R_{wi}		21	25	29	33	31	35		
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00034	0.00014	0.00005	0.00002	0.00003	0.00001		
External Wall Construction	R_{ew}		43	41	44	54	64	74		
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000		
Roof Construction	R_{rr}		32	40	46	51	52	53		
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00026	0.00004	0.00001	0.00000	0.00000	0.00000		
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-32	-36	-40	-44	-43	-47		
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11		
	$10\text{Log}(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1		
Total Internal Sound Pressure Level, L_{eq}	$L_{eq,2}$	A+F+G+3	31.4	21.5	13.3	10.5	5.6	-4.0		

RESULTANT INTERNAL NOISE LEVEL	19
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Rear	$L_{eq,ff}$	46dBA	47	42	39	40	36	41	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - pitched roof	R_{rr}	R_w 56 dB	32	40	46	51	52	53	
Total room absorption (based on RT)	RT_{60}	0.5	8	10	12	12	11	11	

Derivation	Term	Value
Façade area (including window)	S_f	21
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	19
Area of ceiling	S_{rr}	15
$S_f + S_{rr}$	S	35
Reference absorption area	A_0	10
Room volume	V	37

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	47	42	39	40	36	41	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00034	0.00014	0.00005	0.00002	0.00003	0.00001	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		32	40	46	51	52	53	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00026	0.00004	0.00001	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	F	-32	-36	-40	-44	-43	-47	
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11	
	$10 \log(S/A)$	G	6.5	5.5	4.7	4.7	5.1	5.1	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	24.5	13.8	7.1	4.6	0.7	1.8	

RESULTANT INTERNAL NOISE LEVEL	13
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Rear	L _{max,ff}	69dBA	58	54	55	53	48	68	
Rytons TAL4H&M airliner brick vent	D _{ne,w}	D _{ne,w} 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R _w	R _w 31dB	21	25	29	33	31	35	
External wall - cavity	R _{ew}	R _w 54dB	43	41	44	54	64	74	
Roof - pitched roof	R _{rr}	R _w 56 dB	32	40	46	51	52	53	
Total room absorption (based on RT)	RT ₆₀	0.5	8	10	12	12	11	11	

Derivation	Term	Value
Façade area (including window)	S _f	21
Window area	S _{wl}	2
S _f -S _{wl}	S _{ew}	19
Area of ceiling	S _{rr}	15
S _f +S _{rr}	S	35
Reference absorption area	A ₀	10
Room volume	V	37

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	L _{eq,ff}	A	58	54	55	53	48	68	
Rytons TAL4H&M airliner brick vent	D _{n,e}		47.4	47.1	40.5	42.1	44.8	49.6	
	(A ₀ /S)*10 [^] (-D _{ne,w} /10)	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000	
Double Glazed Windows	R _{wl}		21	25	29	33	31	35	
	(S _{wl} /S)*10 [^] (-R _{wl} /10)	C	0.00034	0.00014	0.00005	0.00002	0.00003	0.00001	
External Wall Construction	R _{ew}		43	41	44	54	64	74	
	(S _{ew} /S)*10 [^] (-R _{ew} /10)	D	0.00003	0.00004	0.00002	0.00000	0.00000	0.00000	
Roof Construction	R _{rr}		32	40	46	51	52	53	
	(S _{rr} /S)*10 [^] (-R _{rr} /10)	E	0.00026	0.00004	0.00001	0.00000	0.00000	0.00000	
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-32	-36	-40	-44	-43	-47	
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11	
	10Log(S/A)	G	6.5	5.5	4.7	4.7	5.1	5.1	
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	35.3	26.4	22.8	17.5	12.4	28.3	

RESULTANT INTERNAL NOISE LEVEL	30
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43
2no. Rytons TAL4H&M airliner brick vents	$D_{ne,w}$	Dne,w 38dB	44	44	37	39	42	47
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74
Roof - pitched roof	R_{rr}	R_w 56 dB	32	40	46	51	52	53
Total room absorption (based on RT)	RT_{60}	0.75	19	21	23	23	22	22

Derivation	Term	Value
Façade area (including window)	S_f	8
Window area	S_{wi}	3
$S_f - S_{wi}$	S_{ew}	6
Area of ceiling	S_{rr}	45
$S_f + S_{rr}$	S	53
Reference absorption area	A_0	10
Room volume	V	104

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43
2no. Rytons TAL4H&M airliner brick vents	$D_{n,e}$ $(A_0/S) * 10^{(-D_{ne,w}/10)}$		44.38970004	44.08970004	37.48970004	39.08970004	41.78970004	46.58970004
Double Glazed Windows	R_{wi} $(S_{wi}/S) * 10^{(-R_{wi}/10)}$	B	0.00001	0.00001	0.00003	0.00002	0.00001	0.00000
External Wall Construction	R_{ew} $(S_{ew}/S) * 10^{(-R_{ew}/10)}$	C	0.00039	0.00015	0.00006	0.00002	0.00004	0.00002
Roof Construction	R_{rr} $(S_{rr}/S) * 10^{(-R_{rr}/10)}$	D	43	41	44	54	64	74
Total Sound Insulation Performance	$10Log(B+C+D+E)$	E	32	40	46	51	52	53
Total Absorption Area of Receiver Room	A (furnished)	F	-30	-36	-39	-43	-42	-46
Total Internal Sound Pressure Level, Leq	$10Log(S/A)$	G	19	21	23	23	22	22
	$Leq,2$	A+F+G+3	4.6	4.1	3.7	3.7	3.9	3.9
			36.2	25.4	21.2	17.9	12.8	3.4

RESULTANT INTERNAL NOISE LEVEL	25
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	57dBA	59	54	54	54	48	43	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - pitched roof	R_{rr}	R_w 56 dB	32	40	46	51	52	53	
Total room absorption (based on RT)	RT_{60}	0.5	9	11	13	13	12	12	

Derivation	Term	Value
Façade area (including window)	S_f	5
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	3
Area of ceiling	S_{rr}	20
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	40

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	59	54	54	54	48	43	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00004	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00063	0.00025	0.00010	0.00004	0.00006	0.00003	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		32	40	46	51	52	53	
	$(S_r/S) * 10^{(-R_{rr}/10)}$	E	0.00050	0.00008	0.00002	0.00001	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-29	-35	-38	-41	-41	-45	
Total Absorption Area of Receiver Room	A (furnished)		9	11	13	13	12	12	
	$10\text{Log}(S/A)$	G	4.4	3.6	2.8	2.8	3.2	3.2	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	37.0	26.2	21.5	18.1	13.6	4.2	

RESULTANT INTERNAL NOISE LEVEL	25
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{eq,ff}$	51dBA	53	48	47	46	41	44	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - pitched roof	R_{rr}	R_w 56 dB	32	40	46	51	52	53	
Total room absorption (based on RT)	RT_{60}	0.5	9	11	13	13	12	12	

Derivation	Term	Value
Façade area (including window)	S_f	5
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	3
Area of ceiling	S_{rr}	20
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	40

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	53	48	47	46	41	44	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
Double Glazed Windows	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00004	0.00002	0.00001	0.00000	
	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00063	0.00025	0.00010	0.00004	0.00006	0.00003	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		32	40	46	51	52	53	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00050	0.00008	0.00002	0.00001	0.00000	0.00000	
Total Sound Insulation Performance	$10 \log(B+C+D+E)$	F	-29	-35	-38	-41	-41	-45	
Total Absorption Area of Receiver Room	A (furnished)		9	11	13	13	12	12	
	$10 \log(S/A)$	G	4.4	3.6	2.8	2.8	3.2	3.2	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	30.7	20.1	15.0	10.5	6.4	5.7	

RESULTANT INTERNAL NOISE LEVEL	19
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Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level - Front	$L_{max,ff}$	73dBA	69	59	61	65	56	71	
Rytons TAL4H&M airliner brick vent	$D_{ne,w}$	Dne,w 38dB	47	47	41	42	45	50	
Insul 6mm float glass	R_w	Rw 31dB	21	25	29	33	31	35	
External wall - cavity	R_{ew}	R_w 54dB	43	41	44	54	64	74	
Roof - pitched roof	R_{rr}	R_w 56 dB	32	40	46	51	52	53	
Total room absorption (based on RT)	RT_{60}	0.5	9	11	13	13	12	12	

Derivation	Term	Value
Façade area (including window)	S_f	5
Window area	S_{wi}	2
$S_f - S_{wi}$	S_{ew}	3
Area of ceiling	S_{rr}	20
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	40

Description	Term from Equation	Reference letter	Octave Band Centre Frequency (Hz)						
			125	250	500	1000	2000	4000	
Freefield External Noise Level	$L_{eq,ff}$	A	69	59	61	65	56	71	
Rytons TAL4H&M airliner brick vent	$D_{n,e}$		47.4	47.1	40.5	42.1	44.8	49.6	
	$(A_0/S) * 10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00004	0.00002	0.00001	0.00000	
Double Glazed Windows	R_{wi}		21	25	29	33	31	35	
	$(S_{wi}/S) * 10^{(-R_{wi}/10)}$	C	0.00063	0.00025	0.00010	0.00004	0.00006	0.00003	
External Wall Construction	R_{ew}		43	41	44	54	64	74	
	$(S_{ew}/S) * 10^{(-R_{ew}/10)}$	D	0.00001	0.00001	0.00001	0.00000	0.00000	0.00000	
Roof Construction	R_{rr}		32	40	46	51	52	53	
	$(S_{rr}/S) * 10^{(-R_{rr}/10)}$	E	0.00050	0.00008	0.00002	0.00001	0.00000	0.00000	
Total Sound Insulation Performance	$10\text{Log}(B+C+D+E)$	F	-29	-35	-38	-41	-41	-45	
Total Absorption Area of Receiver Room	A (furnished)		9	11	13	13	12	12	
	$10\text{Log}(S/A)$	G	4.4	3.6	2.8	2.8	3.2	3.2	
Total Internal Sound Pressure Level, Leq	$Leq,2$	A+F+G+3	47.1	31.1	29.1	28.9	21.2	32.6	

RESULTANT INTERNAL NOISE LEVEL	37
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Appendix C



Acoustic Performance

Glazing Configuration

6mm Float Glass

Sound Reduction Indices

Frequency, Hz / dB						Rw	C	Ctr	OITC	STC
125	250	500	1000	2000	4000	31	-2	-3	28	30
19	24	30	35	26	33					

Disclaimer: The acoustic performance data provided in the reports is based on a test protocol or an estimation and may be used if user actual glazing is identical to input data described herein. Acoustic performance data herein is only applicable for glazing dimensions 1,23 m x 1,48 m (as per testing standard). Estimation of acoustic performance is based on component-similarity assumptions which are derived from measured data and interpolation to expand the database of values from test protocols. Due to inherent variations in acoustic performance when testing in accordance with EN ISO 10140-3/EN ISO 10140-2, some variation in the calculated performance can also be expected. As such, the weighted performance, R_w , and adaptation terms, C and C_{tr} , should typically be considered to be accurate within ± 2 dB. However, wider deviations can occur. Actual performance may vary according to the glazing dimensions, frame system, noise sources and many other parameters. The acoustic performance data herein should not be used as a substitute for tests of actual glazing. For more information, please consult Assumptions and Terminology section in Guardian Acoustic Assistant. By accessing this calculator, you agree not to alter or modify the generated report data and information, by any means. Any manual alteration will be your own responsibility and will annul all the content of the report.



Acoustic Performance

Glazing Configuration

6mm Float Glass

10mm Cavity

4mm Float Glass

Sound Reduction Indices

Frequency, Hz / dB						Rw	C	Ctr	OITC	STC
125	250	500	1000	2000	4000	34	-1	-3	29	34
27	26	28	37	36	29					

Disclaimer: The acoustic performance data provided in the reports is based on a test protocol or an estimation and may be used if user actual glazing is identical to input data described herein. Acoustic performance data herein is only applicable for glazing dimensions 1,23 m x 1,48 m (as per testing standard). Estimation of acoustic performance is based on component-similarity assumptions which are derived from measured data and interpolation to expand the database of values from test protocols. Due to inherent variations in acoustic performance when testing in accordance with EN ISO 10140-3/EN ISO 10140-2, some variation in the calculated performance can also be expected. As such, the weighted performance, R_w , and adaptation terms, C and C_{tr} , should typically be considered to be accurate within ± 2 dB. However, wider deviations can occur. Actual performance may vary according to the glazing dimensions, frame system, noise sources and many other parameters. The acoustic performance data herein should not be used as a substitute for tests of actual glazing. For more information, please consult Assumptions and Terminology section in Guardian Acoustic Assistant. By accessing this calculator, you agree not to alter or modify the generated report data and information, by any means. Any manual alteration will be your own responsibility and will annul all the content of the report.

Laboratory airborne sound insulation testing of Rytons Building Products Ltd ventilator systems



Laboratory measurement of airborne sound insulation of small building elements
Element-normalized level difference according to BS EN 20140-10:1992
BRE horizontal transmission suite (B9 051-053)

Client: Rytons Building Products Ltd

Test date: 23/07/2007

Test number: L107-149

Test element: Ventilator

0578

Filler wall area: 9.8 m²

Description:

TAL4H&M ventilator assembly;

x1 MFAB, TAL4000 AirLiner, HM43F Internal (OPEN)

Source room volume: 130 m³

Air temperature: 19 °C

Receive room volume: 115 m³

Air relative humidity: 71 %

Frequency (Hz)	Reverberation time (s)	Background level (dB)	Source level (dB)	Receive level (dB)	$D_{n,e}$ (dB)
50	2.64	28.5	91.9	60.1	34.6
63	1.76	18.0	100.5	69.6	32.0
80	1.98	15.8	99.6	65.1	36.1
100	1.69	16.2	100.1	59.6	41.5
125	1.98	8.6	102.8	60.8	43.6
160	1.74	15.4	102.1	59.8	42.5
200	2.00	31.0	102.3	57.6	45.0
250	1.80	11.1	100.3	57.9	42.3
315	1.64	13.4	100.2	65.7	34.0
400	1.66	23.7	99.7	65.4	33.8
500	1.64	9.1	99.0	61.5	37.0
630	1.58	10.8	98.5	61.9	35.9
800	1.50	9.8	97.6	63.1	33.6
1,000	1.50	16.3	96.4	60.6	34.9
1,250	1.49	13.6	98.2	56.9	40.4
1,600	1.49	5.9	99.0	59.5	38.5
2,000	1.52	6.0	97.5	56.4	40.2
2,500	1.51	6.7	97.8	55.8	41.1
3,150	1.50	7.6	98.0	55.2	42.0
4,000	1.40	8.0	98.8	52.1	45.5
5,000	1.26	9.3	95.8	48.0	46.1

x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr}) = 38 (0;-1) \text{ dB}$ $C_{50-3150} = 0 \text{ dB}$ $C_{50-5000} = 0 \text{ dB}$ $C_{100-5000} = 0 \text{ dB}$
 $C_{tr,50-3150} = -2 \text{ dB}$ $C_{tr,50-5000} = -2 \text{ dB}$ $C_{tr,100-5000} = -1 \text{ dB}$

Evaluation based on laboratory measurement results obtained by an engineering method

Based on the data provided in BS EN 20140-2:1993 it is estimated that the measurement uncertainty should not exceed $\pm 1 \text{ dB}$ for the single-number quantity ($D_{n,e,w}$) and should not exceed the values in Table A1 of BS EN 20140-2:1993 for the data in the individual third octaves ($D_{n,e,w}$)

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Laboratory airborne sound insulation testing of Rytons Building Products Ltd ventilator systems



Laboratory measurement of airborne sound insulation of small building elements
Element-normalized level difference according to BS EN 20140-10:1992
BRE horizontal transmission suite (B9 051-053)

Client: Rytons Building Products Ltd

Test date: 23/07/2007

Test number: L107-149

Test element: Ventilator

0578

Filler wall area: 9.8 m²

Description:

TAL4H&M ventilator assembly;

x1 MFAB, TAL4000 AirLiner, HM43F Internal (OPEN)

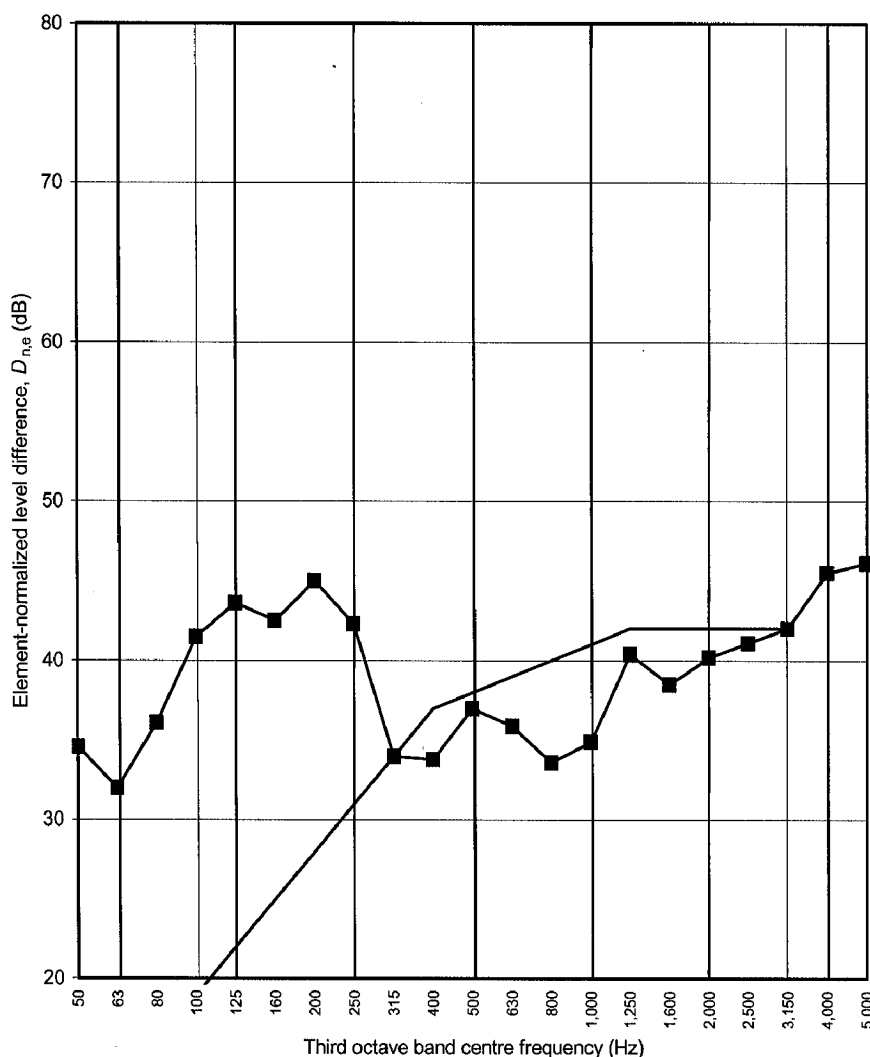
Source room volume: 130 m³

Air temperature: 19 °C

Receive room volume: 115 m³

Air relative humidity: 71 %

Frequency (Hz)	$D_{n,e}$ One-third octave (dB)
50	34.6
63	32.0
80	36.1
100	41.5
125	43.6
160	42.5
200	45.0
250	42.3
315	34.0
400	33.8
500	37.0
630	35.9
800	33.6
1,000	34.9
1,250	40.4
1,600	38.5
2,000	40.2
2,500	41.1
3,150	42.0
4,000	45.5
5,000	46.1



x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr}) = 38 (0;-1) \text{ dB}$ $C_{50-3150} = 0 \text{ dB}$ $C_{50-5000} = 0 \text{ dB}$ $C_{100-5000} = 0 \text{ dB}$
 $C_{tr,50-3150} = -2 \text{ dB}$ $C_{tr,50-5000} = -2 \text{ dB}$ $C_{tr,100-5000} = -1 \text{ dB}$

Evaluation based on laboratory measurement results obtained by an engineering method

Based on the data provided in BS EN 20140-2:1993 it is estimated that the measurement uncertainty should not exceed $\pm 1 \text{ dB}$ for the single-number quantity ($D_{n,e,w}$) and should not exceed the values in Table A1 of BS EN 20140-2:1993 for the data in the individual third octaves ($D_{n,e,w}$)

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