Noise & Vibration Consultants
4 Mulberry Place, Pinnell Road, London, SE9 6AR
Tel: 020 8859 0303
Email: **info@acousticsplus.co.uk** Web: www.acousticsplus.co.uk

ACOUSTICS PLUS

New Residential Development

231 Watford Road, Harrow, HA1 3TU.

Noise Impact Assessment

Author: Andy Dodd B.Sc. (Hons) MIOA
Senior Consultant

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Noise Impact Assessment New Residential Development	
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Author:		**Andy Dodd**	**Senior Consultant**	**30/07/2021**
Reviewer:		**Phil Huffer**	**Principal Consultant**	**30/07/2021**

1. INTRODUCTION

1.1 Acoustics Plus Ltd (APL) is an independent firm of multi-disciplinary acoustic engineers. 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 Fruition Properties Ltd to assess the demolition of the existing building and the erection of a part three, part four and part five storey building to provide 43no. residential dwellings (Use Class C3); car and cycle parking; landscaping, amenity space and play area; and refuse storage and other associated works.

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 new residential accommodations proximity to nearby highways and commercial activities.

1.4 The object of this report is to determine environmental noise levels at the site in accordance with Government planning policy guidance. 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 February 2021 – Ministry of Housing Communities & Local Government;*

(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 land at 231 Watford Road, Harrow, HA1 3TU. The site plan is shown in Diagram 1.

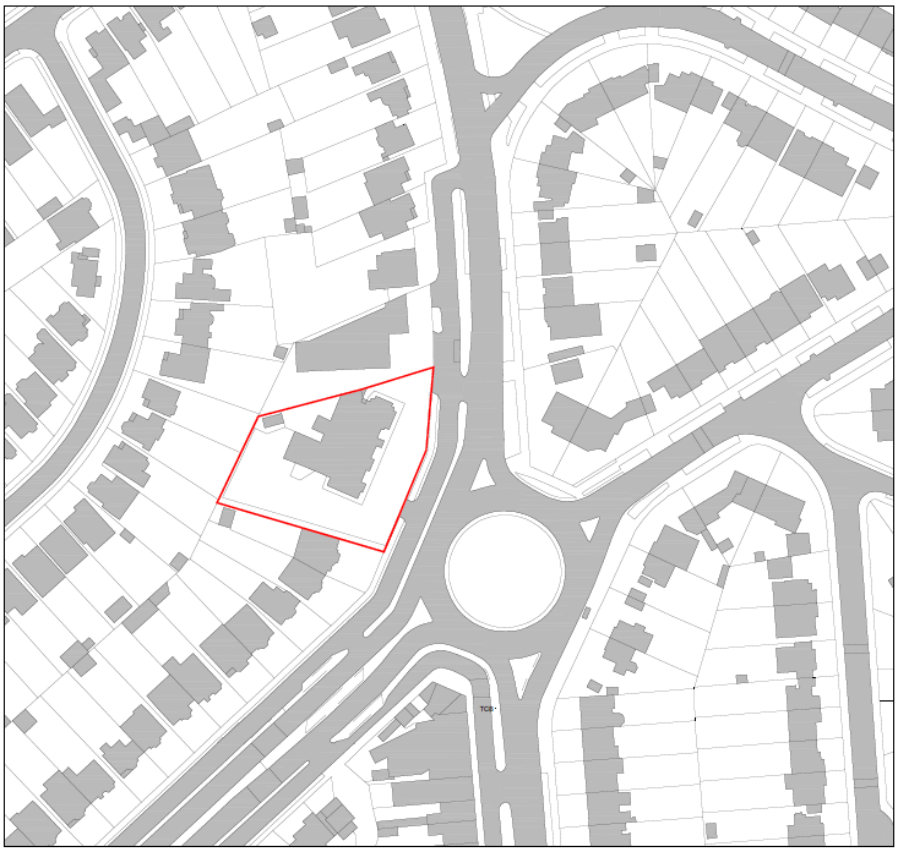


Diagram 1

2.2 It is understood that the planning application is made for the following:

'Demolition of the existing building and the erection of a part three, part four and part five storey building to provide residential dwellings (Use Class C3); car and cycle parking; landscaping, amenity space and play area; and refuse storage and other associated works'.

2.3 The Site is located to the west of the John Lyon roundabout. Vehicular and pedestrian access is made from the east of the Site, from the service road which runs alongside Sudbury Court Drive and Watford Road

2.4 The Site is bound to the north by Formula One Autocentres; to the east by Watford Road and the John Lyon roundabout; to the south by residential properties along Sudbury Court Drive; and to the west by residential properties along Amery Road.

2.5 The surrounding area is predominately residential in nature, although there is an autocentre directly to the north and commercial uses along Watford Road to the south of the John Lyon roundabout. Other nearby uses include Harrow School, Northwick Park, Northwick Park Golf Course and Northwick Park Hospital to the north and Sudbury Court Park/Pasture Park Pass and Sudbury Hill Park to the south. Harrow Town Centre is located approximately 2.5km north of the Site

3. NOISE CRITERIA

3.1 The National Planning Policy Framework (NPPF) was revised in July 2021 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:

(a) 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);

(b) 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.

(c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate.

(d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

(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. 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

(f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

3.3 Paragraph 185 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:

(a) 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;
(b) 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
(c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

3.4 The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010. The vision of the NPSE is to 'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.

3.5 The NPSE aims to 'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

(a) avoid significant adverse impacts on health and quality of life;
(b) mitigate and minimise adverse impacts on health and quality of life; and
(c) 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 Table 1. 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 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 front and rear of the site. These locations were considered to be indicative of the proposed accommodation that will be exposed to the noise sources affecting the site.

4.3 The particulars of the measurement exercise are recorded below:

Date:	21st & 22nd June 2021
Start Time:	11:35hrs
Location:	Front and rear of site, 231 Watford Road.

4.4 A level vs time summary of the noise data measurements obtained are presented in Diagram 2 & 3 below.

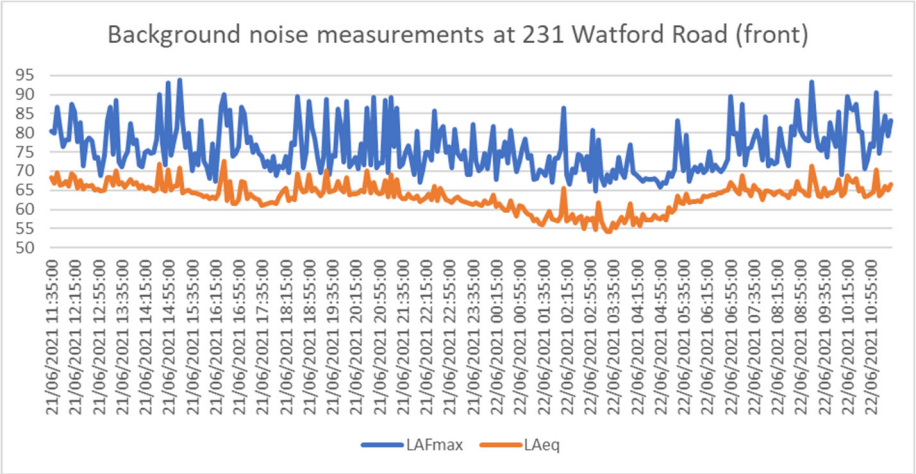


Diagram 2

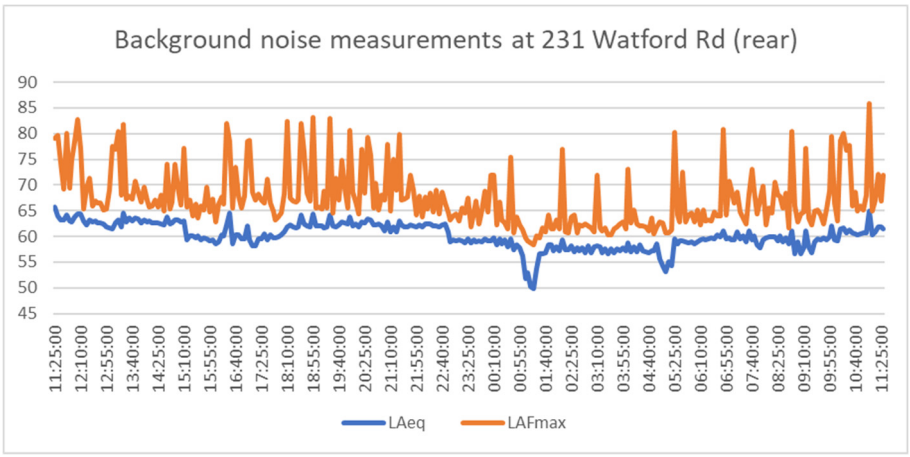


Diagram 3

4.5 The data obtained at the rear of the site is heavily contaminated by noise emanating from the installation of mechanical plant operated by the current restaurant use.

4.6 While it would be prudent to reassess the noise climate at the rear of the building with the restaurant operations ceased in order to consider a relevant noise impact for the future proposals, consideration has been given to the noise data obtained at the front of the site and correcting it for the screening effect provided by the building envelope. A conservative -5dB correction has been assumed to provide a robust assessment.

5. EQUIPMENT

5.1 All measurements were obtained using the following equipment:

- Svantek Svan 971 Serial No 51704
- NTi XL2 Serial No AZA-14612-EO
- Rion Calibrator Type NC-74 Class 1 Serial No. 00410215

5.2 The relevant equipment carries full and current traceable calibration. The equipment, where necessary, was calibrated prior to and after the measurements were carried out.

6. RESULTS

6.1 The summary results are shown in Table 2 below, the full data set (level vs time) are shown in Diagrams 2 & 3.

Location	07:00 to 23:00 $L_{Aeq,16hour}$, dB	23:00 to 07:00 $L_{Aeq,8hour}$, dB	10th highest L_{Amax} dB
Front façade of 231 Watford Road	66	61	79[1]
Rear façade of 231 Watford Road	62	58	69
Corrected rear façade of 231 Watford Road (front -5dB)	61 [-5dB correction]	56 [-5dB correction]	69 [no correction]

Table 2

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

$L_{Aeq, 5mins}$ (dB re 20µPa) - average equivalent sound pressure level
$L_{Amax\ 5mins}$ (dB re 20µPa) – maximum sound pressure level

6.3 The average day time and night time noise levels with the 10th highest LAmax noise levels measured during the night time period have been considered within the calculation exercises.

[1] *From the 24-hr data, the 10th highest $L_{Amax,F}$ measurement during the 8-hr night 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).*

Outside amenity spaces

6.4 When considering external noise levels and the noise levels experienced within the proposed amenity areas, BS8233:2014 "Guidance on sound insulation and noise reduction for buildings" states:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

6.5 Further, World Health Organisation (WHO) "Guidelines on Community Noise" suggests a maximum external noise level of 55 dB(A) L_{Aeq} between 7am and 11pm.

6.6 Onsite noise measurements show that the front and rear facades experience average noise levels of 66dB and 61dB L_{Aeq} during the daytime period, these levels are above the upper limit recommended by BS8233 / WHO.

6.7 Consideration should be given to the guidance within BS8233, where it is recognised that where new development is desirable, external amenity noise levels are not always achievable in areas adjoining strategic transport networks and that the convenience of living in such a location might necessitate a compromise in the noise levels experienced within the amenity spaces.

7. BUILDING ENVELOPE RECOMMENDATIONS

7.1 With regard to site noise levels, the average daytime and night-time noise levels recorded are confirmed in Table 2 above and the full measurement results are presented in Appendix A.

7.2 It is recommended that in order to meet the LPA requirements, acoustic fenestration and ventilation measures be considered in order to protect the daytime and night-time amenity of future occupiers. It is understood that passive ventilation / air intake is be provided to the dwellings to work in combination to a NIBE ventilation system. As such, passive trickle ventilation elements will need to be considered within the calculation exercises.

7.3 To reduce daytime and night-time noise exposure in the proposed dwelling, attention should be given to the sound insulation of the façade of the building. The windows and trickle vents will normally be the weakest elements of any façade.

7.4 Based on the outline information supplied, an outline external wall construction has been considered (steel frame) that has an insulation value of around R_w 69dB, the considered warm type flat roof construction would have an insulation value of around R_w 68dB. These performance values were obtained from proprietary prediction software 'Insul' written by Marshall Day, the values predicted have been corrected by -7dB to account for workmanship and onsite installation. A copy of the prediction outputs for each of the outline constructions considered is contained within Appendix B of this report. Given the external noise levels it is recommended that the glazing performances be considered. This will provide the necessary sound insulation values to reduce the internal noise levels to an acceptable level.

7.5 **If the considered outline constructions are to be amended or revised, the performance values should be checked prior to construction, to ensure the internal noise level requirements of BS8233:2014 are still met.**

7.6 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:

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

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

7.7 Room dimensions and the size of windows have been extracted from scaled drawings. For the purposes of the calculation exercise, an example of each room type (kitchen / lounge and bedroom) located at the front and rear of the building at ground and fourth floor has been considered.

7.8 Due to the varying methods of quantifying the sound insulation performance of building elements, the following parameter is utilised and has been calculated in accordance with the rigorous method as per section G.2.1 of BS8233:2014.

- *R_w Weighted Sound Reduction Index: Single figure sound insulation value derived from the measured sound reduction index R.*

7.9 To meet the criteria, Equation 1 was rearranged in terms of R_w (the sound reduction index of the window – glass and frame combined). This is considered to be the weakest façade element. In order to achieve the required internal level, the sound reduction index of the windows should exceed the values detailed in Table 3. The full calculations are shown in Appendix C.

Accommodation	Sound Reduction Index (R_w)	$D_{n,e,w}$ (dB)
00-03 front no roof (2no. 9x3 vents) – living room	39	38
00-03 front no roof (1no. 9x6 vents) – living room	39	39
00-03 front no roof (4no. 9x3 vents) – living room	39	38
00-03 front no roof (2no. 9x6 vents) – living room	39	39
00-03 front no roof (2no. 9x3 vents) - bedroom	48	38
00-03 rear no roof (2no. 9x3 vents) – living room	34	38
00-03 rear no roof (1no. 9x6 vents) – living room	34	39
00-03 rear no roof (4no. 9x3 vents) – living room	34	38
00-03 rear no roof (2no. 9x6 vents) – living room	34	39
00-03 rear no roof (2no. 9x3 vents) - bedroom	34	38
03-04 front roof (2no. 9x3 vents) – living room	39	38
03-04 front roof (1no. 9x6 vents) – living room	39	39
03-04 front roof (4no. 9x3 vents) – living room	39	38
03-04 front roof (2no. 9x6 vents) – living room	39	39
03-04 front roof (2no. 9x3 vents) - bedroom	48	38
03-04 rear roof (2no. 9x3 vents) – living room	39	38
03-04 rear roof (1no. 9x6 vents) – living room	39	39
03-04 rear roof (4no. 9x3 vents) – living room	39	38
03-04 rear roof (2no. 9x6 vents) – living room	39	39
03-04 rear roof (2no. 9x3 vents) - bedroom	34	38

Table 3

7.10 To achieve the values of R_w as specified in Table 3, a number of glazing systems were considered.

7.11 The required window performance could be achieved using the following glazing configuration (taken from Guardian Glass):

Required window performance	Glazing configuration (example)
Living rooms Rear façade with no roof construction 34dB R_w	6mm float glass 10mm cavity 4mm Float glass
Bedrooms Rear façade 34dB R_w	6mm float glass 10mm cavity 4mm Float glass
Living rooms Front façade 39dB R_w	6.5mm LamiGlass 10mm cavity 6mm Float glass
Living Rooms Rear façade with roof construction 39dB R_w	6.5mm LamiGlass 10mm cavity 6mm Float glass
Bedrooms Front façade 48dB R_w	10mm float glass 24mm cavity 20.5mm LamiGlass

Table 4

7.12 To achieve the $D_{n,e,w}$, as specified in Table 3, a passive Rytons TAL4H&M (9x3 vent) and TALH&M (9x6 vent) through wall ventilators ($D_{n,e,w}$ 38dB & 39dB) were considered for example purposes only to demonstrate the internal noise requirements can be met. Other ventilators with equal or better performance are available. For the benefit of the calculation exercise, a number of different vent combinations were considered for the living rooms depending on the NIBE ventilation system requirements and number of bedrooms within the flat. 2no. TAL4H&M vents were considered for the bedroom spaces, it should be noted that 2no. TAL4H&M vents (9x3 vent) were considered within the calculation exercises and that minimum performance specification would be required for all the bedroom spaces with line of sight of Watford Road.

7.13 A suggested window and ventilation specification is detailed in Appendix D. 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.

7.14 **To be confident that the internal noise levels are achieved, it is recommended that the glazing is over specified (not required where the predicted internal noise level is already 5dB below the requirements) to allow a 5dB workmanship tolerance, this is especially important at frequencies 125Hz and 250Hz. Alternatively, a window system (glass and frame) matching or exceeding the octave band performances considered within the calculation exercises (Appendix C) would be acceptable.**

Purge Ventilation

7.15 Ventilation requirements for dwellings (and other buildings) are covered under the Building Regulations 'Approved Document F – Means of Ventilation, 2010 Edition1 (ADF). Unfortunately, ADF contains very little information on the potential interactions between ventilation and the acoustic design of dwellings.

7.16 ADF requires that:

- *"There shall be adequate means of ventilation provided for people in the building"*
- *"Ventilation is simply the removal of 'stale' indoor air from a building and its replacement with 'fresh' outside air"*.

7.17 Ventilation is required for one or more of the following purposes:

a) Provision of outside air for breathing.
b) .Dilution and removal of airborne pollutants, including odours;
c) Control of excess humidity (arising from water vapour in the indoor air).
d) Provision of air for fuel-burning appliances (which is covered under Part J of the Building Regulations).

7.18 Ventilation may also provide a means to control thermal comfort but this is not controlled under the Building Regulations. Part L addresses minimising energy use due to the effects of solar gain in summer.'

7.19 ADF describes three types of ventilation provision and associated ventilation rates. The types of ventilation are summarised below:

Type of ventilation	Location / Reason for ventilation	When is this required
Whole Dwelling Ventilation	To provide fresh air to the building and to dilute and disperse residual water vapour not dealt with by extract ventilation as well as removing water vapour and other pollutants which are released throughout the building	Continuously
Extract Ventilation	From rooms where most water vapour and/or pollutants are released, e.g. due to activities such as cooking, bathing or photocopying. This is to minimise their spread to the rest of the building.	Continuous or Intermittent
Purge Ventilation	Throughout the building to aid removal of high concentrations of pollutants and water vapour released from occasional activities such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water.	Occasionally

Table 5

7.20 It is understood that 'passive air intake ventilation' is to be provided to the habitable rooms of all the accommodation types in combination to the NIBE ventilation system.

7.21 In addition to the above ADF also states:

- *"Purge ventilation provisions may also be used to improve thermal comfort, although this is not controlled under the Building Regulations*."

7.22 With reference to the provision of purge ventilation within habitable rooms, the approved document provides the following note. 'There may be practical difficulties in achieving this (e.g. if unable to open a window due to excessive noise from outside).' However, no objective guidance is provided in the Approved Document as to what constitutes "excessive noise" or how to resolve the practical difficulties.

7.23 Given the measured noise levels at the site and during occasions when purge ventilation is required with the windows open it should be noted that the acoustic performance of the building envelope will be reduced, typically reducing the insulation to no more than 10 to 15 dB(A). Most residents value the ability to open windows at will, for a variety of reasons but the internal target noise levels can only be practically achieved with windows closed. This is the case as this site is in an area adjacent to transportation and commercial noise sources.

7.24 It should also be noted that the internal noise level guidelines are generally not applicable under "purge ventilation" conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).

8. CONCLUSIONS

8.1 With regard to transportation noise sources impacting the site it can be concluded that:

a) Glazing systems with acoustic performances as detailed in Table 3 for living /kitchen/diners and bedrooms 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.

b) The required level of sound insulation needed to achieve this internal level is based on the proposed building envelope make up.

c) *Passive air intake ventilation in combination with the NIBE ventilation system is proposed for the residential habitable rooms to provide adequate background ventilation and to avoid having to open windows. Ventilators with the relevant acoustic performance (Table 3) 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.*

Appendix A

Background noise measurements at front facade of 231 Watford Road, Harrow, HA1 3TU.

No.	Date & time	LAFmax	LAeq	LZeq 125 Hz	LZeq 250 Hz	LZeq 500 Hz	LZeq 1000 Hz	LZeq 2000 Hz	LZeq 4000 Hz	LZmax 125 Hz	LZmax 250 Hz	LZmax 500 Hz	LZmax 1000 Hz	LZmax 2000 Hz	LZmax 4000 Hz
1	21/06/2021 11:35:00	81	68	73	69	62	63	61	57	89	85	78	75	73	69
2	21/06/2021 11:40:00	80	67	70	65	60	62	60	56	88	85	76	73	72	62
3	21/06/2021 11:45:00	87	70	72	68	62	64	64	62	93	90	84	77	84	83
4	21/06/2021 11:50:00	81	66	63	60	59	62	60	57	79	78	70	81	74	67
5	21/06/2021 11:55:00	76	67	65	61	60	62	60	57	82	75	73	71	72	69
6	21/06/2021 12:00:00	78	67	69	65	61	63	61	58	89	84	74	72	71	70
7	21/06/2021 12:05:00	78	66	69	64	60	62	59	56	87	84	76	73	71	63
8	21/06/2021 12:10:00	88	69	68	64	59	64	64	62	85	81	70	82	85	85
9	21/06/2021 12:15:00	85	69	67	62	60	65	63	59	84	82	71	85	82	79
10	21/06/2021 12:20:00	78	66	69	64	59	62	58	55	85	82	72	77	69	68
11	21/06/2021 12:25:00	83	68	70	67	62	63	61	57	91	87	82	76	79	75
12	21/06/2021 12:30:00	71	65	65	61	58	61	59	56	81	76	66	68	66	61
13	21/06/2021 12:35:00	78	66	69	64	60	62	59	56	87	85	76	72	71	70
14	21/06/2021 12:40:00	79	66	69	65	60	62	59	55	87	84	74	72	68	62
15	21/06/2021 12:45:00	78	66	71	66	60	62	59	55	87	82	74	73	71	61
16	21/06/2021 12:50:00	73	65	66	61	58	61	59	55	82	77	69	69	65	61
17	21/06/2021 12:55:00	74	65	65	60	58	61	59	55	78	73	69	69	68	67
18	21/06/2021 13:00:00	69	65	63	60	58	61	58	54	76	73	68	66	63	62
19	21/06/2021 13:05:00	74	65	64	61	58	61	59	55	83	79	71	71	67	62
20	21/06/2021 13:10:00	83	68	66	60	58	64	63	60	86	76	67	81	81	78
21	21/06/2021 13:15:00	87	68	62	59	58	64	63	60	74	67	65	85	83	81
22	21/06/2021 13:20:00	74	66	65	61	59	62	60	57	84	78	70	69	66	61
23	21/06/2021 13:25:00	88	70	63	62	60	65	64	63	76	77	71	81	84	85
24	21/06/2021 13:30:00	72	66	64	60	59	62	61	57	78	71	70	68	66	66
25	21/06/2021 13:35:00	71	67	66	62	60	62	61	58	82	75	72	67	66	63
26	21/06/2021 13:40:00	74	66	64	60	59	61	60	57	79	76	72	69	68	65
27	21/06/2021 13:45:00	75	67	66	63	59	62	61	58	85	79	71	71	66	64
28	21/06/2021 13:50:00	83	68	69	64	61	63	61	60	84	80	71	72	70	83
29	21/06/2021 13:55:00	77	66	67	63	59	62	60	57	87	83	72	75	69	71
30	21/06/2021 14:00:00	78	67	70	65	60	63	60	57	90	82	74	74	70	63
31	21/06/2021 14:05:00	72	66	66	61	59	62	59	55	80	74	67	68	66	61
32	21/06/2021 14:10:00	71	66	65	61	59	62	60	56	77	70	70	67	66	63
33	21/06/2021 14:15:00	75	65	67	61	59	61	59	55	85	79	69	69	68	66
34	21/06/2021 14:20:00	75	66	68	63	60	62	59	54	86	81	72	73	70	61
35	21/06/2021 14:25:00	75	66	68	62	59	62	59	55	84	81	70	70	67	70
36	21/06/2021 14:30:00	75	65	65	61	59	61	58	53	83	78	69	76	66	74
37	21/06/2021 14:35:00	78	65	67	61	59	62	58	53	85	77	73	76	73	69
38	21/06/2021 14:40:00	90	72	68	62	59	66	66	66	90	81	72	83	85	87
39	21/06/2021 14:45:00	77	65	67	62	59	62	58	54	83	77	72	73	73	71
40	21/06/2021 14:50:00	72	65	66	61	58	61	58	53	85	75	67	67	64	62
41	21/06/2021 14:55:00	93	70	64	60	58	65	66	62	80	71	68	85	93	87
42	21/06/2021 15:00:00	74	65	68	62	59	62	58	51	88	77	69	69	67	65
43	21/06/2021 15:05:00	78	66	70	64	61	63	58	53	88	79	80	71	68	65
44	21/06/2021 15:10:00	81	66	69	62	58	63	59	51	87	79	70	80	77	71
45	21/06/2021 15:15:00	94	71	65	60	57	65	67	62	82	78	67	87	93	86
46	21/06/2021 15:20:00	83	64	65	59	58	60	57	56	84	75	67	65	77	80
47	21/06/2021 15:25:00	76	65	68	62	59	61	57	51	87	81	73	71	68	63
48	21/06/2021 15:30:00	80	65	71	65	60	61	57	51	90	84	77	74	73	60
49	21/06/2021 15:35:00	70	64	64	60	58	61	57	51	81	73	66	66	64	58
50	21/06/2021 15:40:00	75	64	66	62	58	62	57	49	85	78	72	69	67	58
51	21/06/2021 15:45:00	72	64	66	61	59	61	56	50	85	75	68	67	62	61
52	21/06/2021 15:50:00	83	64	64	59	58	61	56	50	79	72	71	83	68	61
53	21/06/2021 15:55:00	73	63	65	61	58	60	55	50	77	78	69	65	64	58
54	21/06/2021 16:00:00	71	64	65	60	58	61	56	49	83	75	68	71	66	62
55	21/06/2021 16:05:00	68	63	63	59	57	60	55	49	78	71	65	65	62	58
56	21/06/2021 16:10:00	77	63	66	60	57	60	55	48	82	75	72	74	74	62
57	21/06/2021 16:15:00	67	63	62	59	57	60	55	49	74	71	68	66	60	61
58	21/06/2021 16:20:00	77	64	68	61	59	61	56	49	90	79	79	67	62	57
59	21/06/2021 16:25:00	87	68	64	60	57	63	62	61	84	76	68	82	83	83
60	21/06/2021 16:30:00	90	73	70	67	63	68	67	64	89	85	80	90	87	83
61	21/06/2021 16:35:00	82	62	68	62	57	58	54	48	90	85	77	78	79	71
62	21/06/2021 16:40:00	86	67	67	60	57	62	63	58	86	76	77	80	85	78
63	21/06/2021 16:45:00	74	62	64	59	56	58	54	49	82	76	68	72	70	65
64	21/06/2021 16:50:00	75	61	66	60	56	58	54	48	84	79	71	72	66	68
65	21/06/2021 16:55:00	76	62	65	60	57	59	55	52	83	81	70	67	66	75
66	21/06/2021 17:00:00	87	67	69	62	58	61	61	60	88	78	74	77	82	84
67	21/06/2021 17:05:00	85	67	70	65	62	62	61	58	89	83	82	84	84	79
68	21/06/2021 17:10:00	77	63	68	61	57	59	55	50	88	78	69	71	74	73
69	21/06/2021 17:15:00	79	64	70	65	59	60	55	49	88	83	77	73	71	69
70	21/06/2021 17:20:00	75	63	68	63	59	59	55	49	85	81	71	69	66	60
71	21/06/2021 17:25:00	77	63	67	61	57	59	55	48	85	78	69	69	64	63
72	21/06/2021 17:30:00	75	63	67	61	57	59	55	49	88	81	71	70	67	68
73	21/06/2021 17:35:00	74	61	63	58	55	58	54	49	76	68	63	67	66	73
74	21/06/2021 17:40:00	71	61	65	59	56	58	53	49	84	76	66	66	66	70
75	21/06/2021 17:45:00	73	61	67	60	56	58	53	47	85	78	69	67	64	58
76	21/06/2021 17:50:00	70	62	64	59	56	58	54	49	83	74	66	66	61	65
77	21/06/2021 17:55:00	74	62	62	59	57	58	55	50	72	69	66	66	65	73
78	21/06/2021 18:00:00	69	62	63	59	56	58	54	50	78	71	65	63	66	69
79	21/06/2021 18:05:00	71	63	63	59	58	60	56	49	77	69	69	67	63	64
80	21/06/2021 18:10:00	71	65	65	61	59	62	57	50	80	72	68	69	64	60
81	21/06/2021 18:15:00	74	66	68	64	60	63	58	50	84	79	72	69	64	59
82	21/06/2021 18:20:00	69	62	64	59	57	59	55	48	80	72	66	67	64	57
83	21/06/2021 18:25:00	77	63	66	62	58	59	55	50	83	79	78	74	72	71
84	21/06/2021 18:30:00	77	62	67	61	57	59	54	49	86	79	71	76	66	68
85	21/06/2021 18:35:00	90	69	63	59	57	68	62	50	76	71	71	91	84	70
86	21/06/2021 18:40:00	81	66	67	63	60	63	58	51	85	85	75	81	76	73
87	21/06/2021 18:45:00	71	65	66	61	59	62	57	49	82	73	70	69	65	62
88	21/06/2021 18:50:00	75	65	68	63	59	62	57	49	85	80	71	71	67	63
89	21/06/2021 18:55:00	88	69	67	63	59	64	64	61	84	80	71	81	86	84
90	21/06/2021 19:00:00	82	65	68	63	59	61	58	49	85	80	75	73	80	70
91	21/06/2021 19:05:00	79	65	69	64	60	63	57	50	84	81	73	76	71	75
92	21/06/2021 19:10:00	73	64	66	62	59	62	57	48	81	78	72	69	63	60
93	21/06/2021 19:15:00	70	63	66	61	58	61	55	47	80	74	65	66	63	56
94	21/06/2021 19:20:00	74	65	68	62	59	62	57	48	85	78	71	69	64	59
95	21/06/2021 19:25:00	89	70	69	69	62	64	63	63	87	86	76	80	87	87
96	21/06/2021 19:30:00	69	65	65	61	59	62	57	48	81	72	65	68	63	63
97	21/06/2021 19:35:00	74	65	65	62	59	62	57	49	83	78	71	69	64	57
98	21/06/2021 19:40:00	74	65	65	62	59	62	57	49	82	80	70	69	67	57
99	21/06/2021 19:45:00	86	67	64	61	59	64	62	51	81	76	68	86	84	74

Background noise measurements at front facade of 231 Watford Road, Harrow, HA1 3TU.

100	21/06/2021 19:50:00	82	65	68	63	60	62	57	48	87	82	81	79	70	66
101	21/06/2021 19:55:00	72	65	66	62	59	62	56	47	86	78	73	70	63	65
102	21/06/2021 20:00:00	88	68	65	61	59	63	62	61	81	76	67	80	84	86
103	21/06/2021 20:05:00	71	64	64	60	58	61	56	47	84	74	65	68	62	57
104	21/06/2021 20:10:00	72	64	65	62	58	61	56	47	82	76	71	69	62	57
105	21/06/2021 20:15:00	74	64	64	60	59	61	56	48	82	77	71	70	64	63
106	21/06/2021 20:20:00	71	64	66	62	58	62	56	47	81	74	65	68	63	58
107	21/06/2021 20:25:00	77	65	68	66	59	62	56	48	85	85	73	70	64	61
108	21/06/2021 20:30:00	72	64	66	61	59	62	56	49	83	73	69	68	67	70
109	21/06/2021 20:35:00	87	70	71	71	67	65	62	59	90	91	88	86	81	80
110	21/06/2021 20:40:00	72	64	65	61	59	62	56	47	82	75	70	69	68	56
111	21/06/2021 20:45:00	89	67	66	62	59	64	60	57	86	80	67	88	84	82
112	21/06/2021 20:50:00	71	65	63	61	59	62	57	47	79	76	74	68	64	56
113	21/06/2021 20:55:00	72	64	63	60	58	62	56	46	80	70	71	71	64	55
114	21/06/2021 21:00:00	72	64	67	62	58	62	56	47	85	79	69	67	62	60
115	21/06/2021 21:05:00	89	68	64	60	58	62	62	61	78	72	68	79	84	85
116	21/06/2021 21:10:00	70	63	62	59	57	61	55	45	79	73	65	69	61	52
117	21/06/2021 21:15:00	89	69	62	59	58	66	62	60	76	69	67	90	84	87
118	21/06/2021 21:20:00	76	63	62	59	57	61	56	46	79	72	72	75	72	67
119	21/06/2021 21:25:00	87	68	71	62	59	63	62	59	95	78	73	82	83	82
120	21/06/2021 21:30:00	71	64	65	61	58	61	55	46	81	76	67	69	64	58
121	21/06/2021 21:35:00	72	63	64	60	57	61	55	45	83	75	68	67	61	53
122	21/06/2021 21:40:00	75	63	65	60	57	60	54	45	86	80	72	71	67	52
123	21/06/2021 21:45:00	77	64	64	61	60	61	55	46	81	79	78	72	67	68
124	21/06/2021 21:50:00	73	63	67	60	58	60	55	46	88	76	73	71	62	56
125	21/06/2021 21:55:00	69	63	63	59	57	60	55	46	81	70	67	68	61	57
126	21/06/2021 22:00:00	80	64	66	61	59	61	55	46	86	78	76	80	76	69
127	21/06/2021 22:05:00	67	62	63	58	56	60	54	44	80	67	63	65	59	55
128	21/06/2021 22:10:00	70	62	63	59	57	60	54	45	82	73	72	67	60	55
129	21/06/2021 22:15:00	75	63	68	59	57	60	55	46	89	70	66	71	63	59
130	21/06/2021 22:20:00	75	64	65	62	59	61	56	47	85	79	72	73	65	57
131	21/06/2021 22:25:00	73	63	65	60	57	60	54	45	86	75	68	70	63	52
132	21/06/2021 22:30:00	86	66	65	60	58	62	61	54	83	76	70	84	85	79
133	21/06/2021 22:35:00	75	62	67	61	57	59	53	44	84	80	71	70	66	56
134	21/06/2021 22:40:00	80	65	69	64	61	61	58	51	88	84	78	78	77	76
135	21/06/2021 22:45:00	82	64	70	65	59	60	55	46	91	87	79	74	73	66
136	21/06/2021 22:50:00	75	62	67	61	57	60	54	43	88	80	71	69	65	53
137	21/06/2021 22:55:00	76	62	66	61	57	60	54	44	87	82	72	71	68	55
138	21/06/2021 23:00:00	71	62	63	59	56	59	54	45	78	74	70	69	65	62
139	21/06/2021 23:05:00	81	63	67	65	58	59	54	45	89	86	79	74	74	62
140	21/06/2021 23:10:00	75	63	67	62	58	60	55	46	85	79	71	70	66	55
141	21/06/2021 23:15:00	73	62	66	61	57	60	54	45	87	78	69	68	65	60
142	21/06/2021 23:20:00	76	62	66	60	56	59	53	45	85	78	69	69	64	66
143	21/06/2021 23:25:00	69	62	62	58	56	60	54	43	82	74	65	67	60	52
144	21/06/2021 23:30:00	69	62	59	58	56	59	54	46	73	67	66	68	62	65
145	21/06/2021 23:35:00	82	61	64	60	56	58	53	44	91	89	80	75	75	64
146	21/06/2021 23:40:00	73	62	65	59	57	59	53	45	81	76	71	69	64	57
147	21/06/2021 23:45:00	70	61	62	58	55	59	53	45	81	77	67	67	62	56
148	21/06/2021 23:50:00	71	61	63	58	55	58	53	43	81	75	66	66	61	54
149	21/06/2021 23:55:00	75	62	61	62	57	59	54	45	77	84	72	68	73	59
150	22/06/2021 00:00:00	71	61	61	57	56	58	54	48	83	76	67	68	66	64
151	22/06/2021 00:05:00	76	62	62	58	56	59	54	46	82	72	68	67	75	70
152	22/06/2021 00:10:00	82	64	67	66	62	58	54	47	86	87	84	69	70	67
153	22/06/2021 00:15:00	68	61	63	57	55	58	53	44	81	71	66	65	60	55
154	22/06/2021 00:20:00	75	62	64	63	59	58	52	43	83	82	79	67	61	51
155	22/06/2021 00:25:00	74	60	64	59	55	57	52	44	83	79	71	69	65	59
156	22/06/2021 00:30:00	78	60	64	59	54	57	51	43	85	84	74	72	70	60
157	22/06/2021 00:35:00	72	60	63	58	55	57	51	43	83	77	70	69	63	58
158	22/06/2021 00:40:00	81	62	62	58	57	59	55	49	80	71	68	76	78	75
159	22/06/2021 00:45:00	75	60	65	60	55	57	51	42	86	81	70	69	65	61
160	22/06/2021 00:50:00	70	58	58	56	53	56	50	42	84	72	66	68	62	57
161	22/06/2021 00:55:00	72	61	67	61	56	58	52	43	85	77	69	67	64	58
162	22/06/2021 01:00:00	76	61	66	60	56	58	52	43	89	81	72	70	68	55
163	22/06/2021 01:05:00	**79**	59	65	60	54	56	51	41	**86**	**85**	**76**	**72**	**70**	**55**
164	22/06/2021 01:10:00	73	59	64	59	54	55	50	40	84	78	70	68	63	56
165	22/06/2021 01:15:00	74	58	63	57	53	56	50	40	84	79	69	69	65	50
166	22/06/2021 01:20:00	68	57	56	54	51	55	49	39	78	69	62	67	60	51
167	22/06/2021 01:25:00	68	58	61	55	52	55	49	39	80	73	65	66	58	51
168	22/06/2021 01:30:00	70	56	61	55	51	53	47	39	82	75	66	66	58	51
169	22/06/2021 01:35:00	70	56	60	55	50	53	47	37	78	76	67	65	60	47
170	22/06/2021 01:40:00	69	58	61	55	52	55	49	39	81	74	65	64	58	51
171	22/06/2021 01:45:00	74	59	61	57	56	56	51	45	83	74	70	69	64	71
172	22/06/2021 01:50:00	67	58	61	55	52	55	49	39	80	71	64	65	58	52
173	22/06/2021 01:55:00	73	57	57	53	51	55	49	39	79	73	67	71	67	63
174	22/06/2021 02:00:00	73	57	60	56	53	54	48	40	83	78	70	69	63	54
175	22/06/2021 02:05:00	76	58	63	58	53	55	49	40	85	79	70	71	67	50
176	22/06/2021 02:10:00	86	66	65	60	53	58	60	59	90	85	76	80	85	82
177	22/06/2021 02:15:00	69	57	58	54	51	55	49	39	81	73	65	64	58	51
178	22/06/2021 02:20:00	67	58	58	54	51	55	49	39	80	70	63	65	59	51
179	22/06/2021 02:25:00	71	59	57	54	52	57	51	41	76	70	64	69	62	57
180	22/06/2021 02:30:00	70	56	58	53	51	54	48	40	82	73	65	68	61	55
181	22/06/2021 02:35:00	75	58	64	59	53	54	48	40	86	81	70	69	66	55
182	22/06/2021 02:40:00	74	58	61	57	54	55	50	40	80	75	75	68	62	50
183	22/06/2021 02:45:00	70	55	57	52	49	53	46	40	80	76	66	65	60	57
184	22/06/2021 02:50:00	74	58	61	56	52	55	49	40	82	80	68	69	65	52
185	22/06/2021 02:55:00	67	57	56	53	52	55	49	39	78	74	64	67	60	51
186	22/06/2021 03:00:00	81	58	64	60	53	54	49	40	90	88	77	74	73	63
187	22/06/2021 03:05:00	65	55	55	52	49	52	46	36	76	68	62	64	57	48
188	22/06/2021 03:10:00	78	62	65	66	61	55	50	42	83	84	79	65	62	61
189	22/06/2021 03:15:00	68	57	57	54	51	54	49	40	80	72	67	66	61	56
190	22/06/2021 03:20:00	66	55	55	52	49	53	47	38	77	72	63	65	59	50
191	22/06/2021 03:25:00	69	54	60	53	49	51	45	39	82	74	65	63	56	59
192	22/06/2021 03:30:00	67	54	57	52	49	52	45	36	79	70	63	64	58	46
193	22/06/2021 03:35:00	70	56	59	55	51	54	48	38	80	77	66	64	59	53
194	22/06/2021 03:40:00	68	55	60	53	50	53	46	36	82	72	65	65	57	45
195	22/06/2021 03:45:00	74	57	61	55	52	53	48	40	82	79	69	68	62	54
196	22/06/2021 03:50:00	70	58	59	55	53	55	50	41	76	66	63	69	62	53
197	22/06/2021 03:55:00	68	57	59	55	52	53	48	40	81	73	65	64	61	57
198	22/06/2021 04:00:00	73	58	61	56	52	56	50	38	84	79	69	69	65	49
199	22/06/2021 04:05:00	77	61	65	64	61	55	49	40	82	81	81	71	63	54
200	22/06/2021 04:10:00	70	56	61	55	51	53	47	39	80	75	67	64	60	55

Background noise measurements at front facade of 231 Watford Road, Harrow, HA1 3TU.

201	22/06/2021 04:15:00	69	58	60	55	52	55	49	40	81	73	67	67	63	51
202	22/06/2021 04:20:00	68	56	60	54	52	52	47	40	81	74	67	64	60	57
203	22/06/2021 04:25:00	67	59	56	54	53	56	51	42	71	66	65	67	60	55
204	22/06/2021 04:30:00	68	57	54	52	51	55	49	40	71	64	63	68	60	49
205	22/06/2021 04:35:00	68	57	57	53	51	55	49	42	74	66	64	66	60	54
206	22/06/2021 04:40:00	68	57	59	54	51	55	49	40	80	73	64	65	58	53
207	22/06/2021 04:45:00	68	58	60	55	53	56	50	42	77	72	67	66	61	56
208	22/06/2021 04:50:00	67	58	56	53	51	56	50	41	76	68	60	66	59	60
209	22/06/2021 04:55:00	66	57	56	53	52	55	49	42	75	66	64	64	59	54
210	22/06/2021 05:00:00	67	58	55	54	52	56	50	41	70	66	63	66	60	55
211	22/06/2021 05:05:00	67	57	57	53	52	55	49	40	76	67	65	65	60	54
212	22/06/2021 05:10:00	70	61	59	57	55	58	52	44	79	74	66	67	62	55
213	22/06/2021 05:15:00	69	59	57	56	54	57	51	43	70	69	67	65	61	56
214	22/06/2021 05:20:00	70	60	63	57	55	57	51	41	81	78	72	67	60	51
215	22/06/2021 05:25:00	83	64	59	57	56	60	57	55	71	68	65	78	79	78
216	22/06/2021 05:30:00	76	62	64	61	58	59	53	43	82	80	75	74	71	62
217	22/06/2021 05:35:00	70	62	62	57	55	59	53	43	80	69	64	68	62	53
218	22/06/2021 05:40:00	79	64	70	62	58	61	55	48	93	82	70	72	65	62
219	22/06/2021 05:45:00	67	62	62	58	56	59	54	45	75	66	65	65	60	55
220	22/06/2021 05:50:00	70	62	61	58	56	60	54	44	77	69	70	67	61	55
221	22/06/2021 05:55:00	71	62	60	59	57	60	54	44	77	75	70	68	60	54
222	22/06/2021 06:00:00	70	62	61	59	57	60	54	46	79	70	70	66	64	64
223	22/06/2021 06:05:00	72	62	61	58	57	59	54	47	79	71	68	69	64	63
224	22/06/2021 06:10:00	70	63	62	60	58	61	55	46	76	71	67	67	63	57
225	22/06/2021 06:15:00	70	63	67	60	58	61	55	46	83	72	68	68	64	62
226	22/06/2021 06:20:00	75	64	62	60	59	61	56	47	78	77	73	70	67	65
227	22/06/2021 06:25:00	70	64	62	60	59	61	56	47	82	69	67	68	63	66
228	22/06/2021 06:30:00	72	64	63	60	58	62	56	46	83	78	66	68	62	56
229	22/06/2021 06:35:00	71	64	64	61	59	62	56	48	77	70	71	67	63	60
230	22/06/2021 06:40:00	70	64	62	60	59	62	56	47	78	70	66	68	63	58
231	22/06/2021 06:45:00	71	65	64	61	60	62	57	48	79	72	70	69	62	58
232	22/06/2021 06:50:00	73	65	65	62	60	62	57	48	83	77	70	70	65	58
233	22/06/2021 06:55:00	90	67	67	63	63	64	58	53	87	85	86	87	79	78
234	22/06/2021 07:00:00	80	66	66	65	62	63	58	49	82	81	78	77	70	60
235	22/06/2021 07:05:00	80	65	65	63	60	62	57	49	80	74	70	80	76	69
236	22/06/2021 07:10:00	74	64	68	62	59	61	56	48	87	80	73	67	66	66
237	22/06/2021 07:15:00	87	69	65	62	59	67	62	55	82	76	71	87	82	79
238	22/06/2021 07:20:00	72	65	66	62	60	62	57	48	83	75	70	68	64	65
239	22/06/2021 07:25:00	76	65	68	63	60	62	57	49	86	81	71	71	67	60
240	22/06/2021 07:30:00	76	64	66	62	59	60	56	48	84	83	73	70	68	59
241	22/06/2021 07:35:00	79	66	72	66	62	63	58	49	89	83	80	73	70	59
242	22/06/2021 07:40:00	81	65	65	62	60	62	58	52	79	72	70	74	78	77
243	22/06/2021 07:45:00	78	65	65	65	60	62	57	49	81	83	75	78	74	69
244	22/06/2021 07:50:00	73	63	67	63	58	59	54	49	84	78	68	69	70	67
245	22/06/2021 07:55:00	84	65	69	66	62	60	55	48	89	89	85	74	71	68
246	22/06/2021 08:00:00	71	65	65	62	60	62	57	48	78	77	70	67	69	60
247	22/06/2021 08:05:00	73	65	65	61	60	62	57	48	78	70	73	68	70	60
248	22/06/2021 08:10:00	72	64	64	61	58	61	56	50	82	74	67	67	63	71
249	22/06/2021 08:15:00	72	65	67	62	59	62	56	47	84	77	69	68	70	56
250	22/06/2021 08:20:00	81	65	71	65	60	61	56	48	90	87	78	74	73	64
251	22/06/2021 08:25:00	77	64	67	63	59	60	56	49	84	81	76	73	68	64
252	22/06/2021 08:30:00	74	64	66	62	59	61	55	48	85	79	69	68	63	64
253	22/06/2021 08:35:00	71	63	66	61	58	60	55	47	83	72	70	68	64	62
254	22/06/2021 08:40:00	82	65	69	65	59	61	56	47	88	88	80	75	75	63
255	22/06/2021 08:45:00	79	64	69	65	59	60	55	48	89	85	76	72	71	60
256	22/06/2021 08:50:00	89	67	70	64	59	61	62	59	88	81	72	75	86	84
257	22/06/2021 08:55:00	81	65	69	65	60	62	56	48	90	88	79	73	73	62
258	22/06/2021 09:00:00	79	65	69	64	59	62	56	47	90	86	77	76	75	59
259	22/06/2021 09:05:00	78	64	69	64	59	61	55	47	87	83	74	72	70	59
260	22/06/2021 09:10:00	78	64	69	63	59	60	55	46	88	84	73	71	70	63
261	22/06/2021 09:15:00	93	71	73	68	62	65	66	63	95	89	81	86	90	87
262	22/06/2021 09:20:00	80	67	73	68	62	63	58	49	89	86	78	74	73	61
263	22/06/2021 09:25:00	76	64	67	63	58	61	55	46	85	81	73	72	68	57
264	22/06/2021 09:30:00	75	63	66	61	58	61	55	46	87	81	70	70	66	59
265	22/06/2021 09:35:00	79	66	71	66	61	62	57	48	89	85	77	73	72	64
266	22/06/2021 09:40:00	74	63	67	62	58	60	55	47	84	78	70	69	62	61
267	22/06/2021 09:45:00	83	64	69	65	59	61	55	47	94	89	80	74	75	65
268	22/06/2021 09:50:00	79	64	69	64	59	61	55	48	93	85	77	72	69	71
269	22/06/2021 09:55:00	76	65	69	64	60	62	57	50	86	82	72	74	74	69
270	22/06/2021 10:00:00	85	68	67	62	60	67	58	48	85	80	77	85	73	63
271	22/06/2021 10:05:00	69	64	64	61	59	61	55	47	78	76	70	66	61	56
272	22/06/2021 10:10:00	78	64	69	64	59	61	55	47	90	84	71	70	67	56
273	22/06/2021 10:15:00	89	69	68	63	59	65	63	58	87	80	73	86	88	79
274	22/06/2021 10:20:00	87	68	66	62	59	63	62	57	82	75	68	81	86	79
275	22/06/2021 10:25:00	86	67	66	62	60	62	60	60	84	81	80	78	81	84
276	22/06/2021 10:30:00	87	68	70	66	61	64	61	60	94	87	80	83	85	83
277	22/06/2021 10:35:00	80	65	70	65	60	61	56	47	93	85	79	74	73	62
278	22/06/2021 10:40:00	80	66	72	67	61	62	56	47	93	86	78	74	72	63
279	22/06/2021 10:45:00	71	63	64	60	59	61	55	47	78	71	68	67	64	62
280	22/06/2021 10:50:00	73	63	66	62	58	60	55	48	85	78	68	68	70	67
281	22/06/2021 10:55:00	77	64	65	62	59	61	55	50	85	81	70	70	67	69
282	22/06/2021 11:00:00	76	64	69	64	60	61	56	49	88	82	72	71	69	67
283	22/06/2021 11:05:00	91	70	73	72	70	65	58	49	93	94	91	85	79	71
284	22/06/2021 11:10:00	75	63	64	61	59	61	55	47	85	79	73	70	65	59
285	22/06/2021 11:15:00	80	64	69	65	59	61	55	47	90	85	76	73	71	60
286	22/06/2021 11:20:00	85	66	73	68	61	62	57	49	94	91	81	76	76	68
287	22/06/2021 11:25:00	79	65	71	66	60	62	56	47	89	85	77	72	71	60
288	22/06/2021 11:30:00	83	67	74	68	62	62	57	51	98	88	80	76	75	75

front	LAeq	LZeq 125 Hz	LZeq 250 Hz	LZeq 500 Hz	LZeq 1000 Hz	LZeq 2000 Hz	LZeq 4000 Hz
day	66	68	63	59	62	59	55
night	61	63	59	56	58	53	46

LAFmax	LZmax 125 Hz	LZmax 250 Hz	LZmax 500 Hz	LZmax 1000 Hz	LZmax 2000 Hz	LZmax 4000 Hz
79	86	85	76	72	70	55

Background noise measurements at rear of 231 Watford Road,Harrow, HA1 3TU.

Date	Time	LZFmax 125	LZFmax 250	LZFmax 500	LZFmax 1000	LZFmax 2000	LZFmax 4000	LZeq 125	LZeq 250	LZeq 500	LZeq 1000	LZeq 2000	LZeq 4000	LAeq	LAFmax
21/06/2021	11:25:00	73	74	81	71	65	54	70	67	65	60	54	47	66	79
21/06/2021	11:30:00	77	76	73	74	75	69	69	64	62	59	55	50	64	80
21/06/2021	11:35:00	79	74	64	67	71	62	69	63	60	58	55	50	63	74
21/06/2021	11:40:00	73	69	63	66	62	57	69	63	61	58	54	49	63	69
21/06/2021	11:45:00	72	65	63	70	78	73	68	62	60	58	57	54	64	80
21/06/2021	11:50:00	73	65	63	65	62	64	68	62	60	58	54	49	63	69
21/06/2021	11:55:00	73	74	74	70	65	62	68	62	60	58	54	49	63	75
21/06/2021	12:00:00	76	74	72	70	75	71	69	63	61	59	55	50	64	78
21/06/2021	12:05:00	76	65	63	72	80	77	69	62	60	59	58	54	64	83
21/06/2021	12:10:00	74	66	66	74	75	71	69	62	60	60	58	53	64	77
21/06/2021	12:15:00	74	65	63	61	57	56	69	62	61	58	54	48	63	65
21/06/2021	12:20:00	76	72	69	69	59	56	68	62	60	57	53	47	62	69
21/06/2021	12:25:00	77	67	65	65	69	63	69	63	61	58	54	48	63	71
21/06/2021	12:30:00	73	66	64	61	59	53	69	63	60	58	54	48	63	66
21/06/2021	12:35:00	73	66	64	63	60	57	69	63	60	58	54	48	63	67
21/06/2021	12:40:00	73	66	62	63	59	53	69	62	60	58	53	47	63	67
21/06/2021	12:45:00	74	67	63	64	58	54	69	62	60	58	53	47	63	67
21/06/2021	12:50:00	73	65	63	63	57	51	69	62	60	57	53	47	62	65
21/06/2021	12:55:00	72	65	61	62	59	53	68	62	59	57	53	47	62	65
21/06/2021	13:00:00	74	69	70	64	59	51	67	61	59	57	52	46	62	69
21/06/2021	13:05:00	75	69	63	64	76	65	67	61	57	57	54	48	62	78
21/06/2021	13:10:00	76	64	60	70	75	68	67	61	57	58	56	52	63	77
21/06/2021	13:15:00	71	66	60	77	77	72	67	60	57	59	57	52	63	81
21/06/2021	13:20:00	75	71	66	65	57	51	68	62	58	57	53	48	62	68
21/06/2021	13:25:00	78	76	65	74	79	74	69	63	60	59	58	54	65	82
21/06/2021	13:30:00	73	68	62	64	60	55	68	62	60	58	54	49	63	67
21/06/2021	13:35:00	75	71	67	65	61	62	69	63	61	58	55	50	64	68
21/06/2021	13:40:00	73	65	69	63	59	57	68	62	61	58	54	49	63	67
21/06/2021	13:45:00	73	66	63	63	60	69	69	63	61	59	55	50	64	71
21/06/2021	13:50:00	78	69	64	62	66	57	69	63	60	59	55	50	63	69
21/06/2021	13:55:00	72	72	63	63	61	64	68	62	60	58	54	50	63	67
21/06/2021	14:00:00	74	69	66	66	59	67	69	62	61	58	54	49	63	70
21/06/2021	14:05:00	77	66	63	64	60	53	69	63	60	58	54	48	63	67
21/06/2021	14:10:00	75	65	63	61	58	56	69	63	61	58	54	48	63	66
21/06/2021	14:15:00	73	66	63	63	58	52	69	62	61	58	53	47	63	66
21/06/2021	14:20:00	73	68	63	64	59	53	69	63	60	58	53	47	63	67
21/06/2021	14:25:00	73	67	63	62	58	53	69	63	60	58	53	46	63	66
21/06/2021	14:30:00	76	71	64	61	57	65	69	63	60	58	52	46	62	68
21/06/2021	14:35:00	73	65	63	61	56	58	68	63	60	57	52	45	62	65
21/06/2021	14:40:00	74	68	63	68	70	69	69	63	60	58	56	53	64	74
21/06/2021	14:45:00	77	69	63	61	55	56	69	63	60	58	52	45	63	65
21/06/2021	14:50:00	73	66	65	63	59	57	68	63	60	58	52	46	63	67
21/06/2021	14:55:00	73	65	63	66	72	65	69	63	60	58	54	49	63	74
21/06/2021	15:00:00	77	68	63	61	63	66	69	63	61	58	54	47	63	69
21/06/2021	15:05:00	74	68	66	62	60	57	69	63	60	58	53	47	63	66
21/06/2021	15:10:00	76	71	64	71	76	68	67	61	59	58	56	51	63	77
21/06/2021	15:15:00	68	63	60	63	61	56	63	59	57	55	50	43	59	66
21/06/2021	15:20:00	73	63	61	59	61	63	63	59	58	56	51	45	60	67
21/06/2021	15:25:00	70	64	64	60	55	50	64	59	58	56	51	43	60	64
21/06/2021	15:30:00	72	70	66	61	54	49	64	59	57	56	50	42	60	66
21/06/2021	15:35:00	72	63	63	59	54	54	63	59	58	56	51	43	60	64
21/06/2021	15:40:00	68	64	62	58	64	55	63	58	56	55	50	42	59	66
21/06/2021	15:45:00	72	63	62	61	58	58	64	59	58	55	50	43	60	65
21/06/2021	15:50:00	67	64	62	68	63	56	63	59	57	55	51	43	60	70
21/06/2021	15:55:00	69	69	63	60	59	54	64	60	57	54	49	41	59	65
21/06/2021	16:00:00	79	71	63	63	63	63	64	58	56	55	51	44	59	67
21/06/2021	16:05:00	70	61	61	58	55	55	63	58	56	54	49	41	59	63
21/06/2021	16:10:00	70	63	59	63	62	61	64	59	56	54	49	45	59	66
21/06/2021	16:15:00	68	64	62	62	62	63	63	59	58	56	51	48	60	68
21/06/2021	16:20:00	79	73	64	62	60	58	64	60	58	55	51	45	60	66
21/06/2021	16:25:00	68	64	61	72	80	74	63	59	57	57	57	52	62	82
21/06/2021	16:30:00	74	75	72	74	76	73	65	61	58	59	59	55	65	79
21/06/2021	16:35:00	68	64	62	61	61	57	63	58	57	54	48	42	59	66
21/06/2021	16:40:00	77	64	65	68	72	64	64	59	57	55	53	48	60	73
21/06/2021	16:45:00	71	63	61	65	62	60	63	59	58	55	51	50	60	68
21/06/2021	16:50:00	69	63	60	63	58	56	64	58	56	55	51	48	60	66
21/06/2021	16:55:00	76	69	64	66	62	59	63	58	57	55	50	48	60	68
21/06/2021	17:00:00	74	68	58	75	77	70	59	54	52	57	58	53	62	78
21/06/2021	17:05:00	71	69	71	70	77	68	64	57	56	54	53	47	59	79
21/06/2021	17:10:00	70	65	64	67	60	54	63	57	56	54	49	41	58	69
21/06/2021	17:15:00	78	68	59	59	63	60	63	57	55	54	50	43	58	67
21/06/2021	17:20:00	70	68	69	63	65	61	63	58	57	55	51	46	60	68
21/06/2021	17:25:00	79	66	63	61	63	57	66	59	57	55	50	42	60	67
21/06/2021	17:30:00	70	65	61	59	62	64	66	60	59	56	51	45	61	66
21/06/2021	17:35:00	81	73	63	68	63	59	66	60	57	54	49	43	59	71
21/06/2021	17:40:00	73	64	69	62	61	56	66	60	59	55	50	44	60	67
21/06/2021	17:45:00	71	68	62	60	56	52	66	60	58	55	49	40	60	65
21/06/2021	17:50:00	75	65	61	60	56	52	66	60	58	55	49	41	60	63
21/06/2021	17:55:00	69	65	64	60	55	54	66	60	58	55	49	40	60	64
21/06/2021	18:00:00	72	66	63	61	57	51	66	61	59	55	50	42	60	65
21/06/2021	18:05:00	70	64	70	62	61	57	66	61	59	56	51	42	61	68
21/06/2021	18:10:00	75	73	64	63	77	79	67	62	59	57	53	50	62	82
21/06/2021	18:15:00	80	74	68	63	58	54	69	62	60	58	52	43	62	68
21/06/2021	18:20:00	73	65	62	60	59	61	69	62	60	57	51	43	62	67
21/06/2021	18:25:00	74	70	66	63	58	63	69	62	59	57	51	44	62	67
21/06/2021	18:30:00	74	65	62	62	60	61	69	62	60	57	51	44	62	67
21/06/2021	18:35:00	74	66	68	82	77	64	69	62	59	61	56	44	64	82
21/06/2021	18:40:00	75	70	70	70	72	68	69	62	60	58	52	45	62	76
21/06/2021	18:45:00	73	66	66	63	62	58	69	62	60	58	52	43	62	69
21/06/2021	18:50:00	73	65	63	64	59	54	69	62	60	57	51	43	62	67
21/06/2021	18:55:00	73	68	65	72	79	79	69	62	60	59	58	54	64	83
21/06/2021	19:00:00	74	67	63	61	58	53	69	62	60	57	51	43	62	66
21/06/2021	19:05:00	81	66	63	60	57	57	69	62	59	58	52	43	62	66
21/06/2021	19:10:00	73	65	63	62	59	53	69	62	60	58	51	43	62	65
21/06/2021	19:15:00	74	68	62	61	66	58	69	62	59	57	51	43	62	69
21/06/2021	19:20:00	76	66	63	63	57	52	69	62	59	57	51	42	62	66
21/06/2021	19:25:00	75	81	69	71	82	73	69	64	60	58	58	51	64	83
21/06/2021	19:30:00	75	66	61	60	55	60	69	62	59	58	51	43	62	65

Background noise measurements at rear of 231 Watford Road,Harrow, HA1 3TU.

Date	Time	LZFmax 125	LZFmax 250	LZFmax 500	LZFmax 1000	LZFmax 2000	LZFmax 4000	LZeq 125	LZeq 250	LZeq 500	LZeq 1000	LZeq 2000	LZeq 4000	LAeq	LAFmax
21/06/2021	19:35:00	74	75	70	66	60	54	69	62	59	58	51	43	62	71
21/06/2021	19:40:00	74	65	65	63	62	53	69	62	59	58	52	43	62	67
21/06/2021	19:45:00	73	67	63	69	74	57	69	62	60	58	54	44	63	75
21/06/2021	19:50:00	79	67	68	64	61	59	69	62	60	58	52	43	63	69
21/06/2021	19:55:00	77	67	65	62	56	50	69	62	60	58	52	43	63	66
21/06/2021	20:00:00	74	65	62	74	78	74	69	62	60	58	57	52	64	81
21/06/2021	20:05:00	73	65	66	64	61	57	69	62	60	58	51	43	62	69
21/06/2021	20:10:00	81	70	64	63	59	55	69	62	60	58	51	43	62	67
21/06/2021	20:15:00	73	65	62	61	55	48	69	62	59	57	51	42	62	64
21/06/2021	20:20:00	80	84	67	65	61	53	69	64	60	58	52	45	63	77
21/06/2021	20:25:00	77	74	65	62	57	52	69	63	60	58	52	46	63	68
21/06/2021	20:30:00	77	65	65	77	75	69	69	62	60	59	56	50	63	79
21/06/2021	20:35:00	82	77	74	71	69	59	70	64	62	58	52	43	63	76
21/06/2021	20:40:00	73	65	63	63	57	50	69	62	60	58	51	43	62	66
21/06/2021	20:45:00	78	72	63	67	67	61	69	62	60	58	52	44	62	70
21/06/2021	20:50:00	73	66	65	62	57	46	69	62	60	58	52	42	62	65
21/06/2021	20:55:00	73	70	64	65	61	58	69	62	60	58	51	42	62	68
21/06/2021	21:00:00	74	67	62	64	60	52	68	60	58	57	51	42	61	67
21/06/2021	21:05:00	72	64	63	71	76	72	68	60	59	58	56	52	63	78
21/06/2021	21:10:00	72	64	61	62	60	52	67	60	58	57	51	42	61	65
21/06/2021	21:15:00	72	63	63	73	67	68	68	60	59	58	53	47	62	75
21/06/2021	21:20:00	71	64	65	66	64	55	68	60	58	57	51	42	61	69
21/06/2021	21:25:00	79	67	65	72	77	74	68	61	59	58	56	51	63	80
21/06/2021	21:30:00	73	66	63	65	58	51	69	62	60	58	51	42	62	67
21/06/2021	21:35:00	73	65	63	64	60	53	69	62	60	57	51	42	62	67
21/06/2021	21:40:00	73	65	63	65	61	52	69	62	60	57	51	42	62	68
21/06/2021	21:45:00	76	73	71	67	60	56	69	62	60	58	51	42	62	72
21/06/2021	21:50:00	80	67	71	66	60	53	69	62	60	57	51	42	62	69
21/06/2021	21:55:00	79	66	65	61	55	50	69	62	60	57	51	42	62	64
21/06/2021	22:00:00	81	71	65	67	63	51	69	62	60	58	51	43	62	68
21/06/2021	22:05:00	73	65	63	60	53	46	69	62	60	57	50	42	62	64
21/06/2021	22:10:00	73	66	64	65	60	52	69	62	61	58	51	43	62	68
21/06/2021	22:15:00	76	65	63	62	56	52	69	62	61	58	51	43	62	65
21/06/2021	22:20:00	73	70	64	66	62	55	69	62	61	58	52	43	63	69
21/06/2021	22:25:00	73	67	62	62	57	54	69	62	60	58	51	43	62	65
21/06/2021	22:30:00	73	64	62	66	66	62	69	62	60	58	52	44	62	69
21/06/2021	22:35:00	73	65	63	61	55	50	68	62	60	57	51	42	62	64
21/06/2021	22:40:00	74	69	68	64	64	57	69	62	61	57	51	44	62	69
21/06/2021	22:45:00	73	64	63	64	57	53	69	62	61	58	51	43	62	67
21/06/2021	22:50:00	73	64	63	61	58	48	67	60	59	56	50	41	61	65
21/06/2021	22:55:00	68	63	60	60	55	50	63	58	57	55	49	39	59	63
21/06/2021	23:00:00	73	67	63	61	54	46	63	59	58	55	49	39	59	64
21/06/2021	23:05:00	68	71	61	59	53	49	63	59	57	55	49	39	59	64
21/06/2021	23:10:00	68	62	62	60	55	50	63	58	58	55	49	40	59	63
21/06/2021	23:15:00	68	62	68	62	56	51	63	59	58	55	49	40	59	66
21/06/2021	23:20:00	75	63	62	61	56	54	64	59	57	54	48	41	59	65
21/06/2021	23:25:00	69	67	67	63	60	56	63	59	58	55	49	42	60	68
21/06/2021	23:30:00	67	64	61	60	53	54	63	59	56	54	48	42	59	62
21/06/2021	23:35:00	68	64	61	63	56	56	63	59	58	55	49	41	59	65
21/06/2021	23:40:00	69	64	67	62	56	53	63	59	57	55	49	40	59	67
21/06/2021	23:45:00	73	63	61	60	56	56	63	59	58	55	49	41	59	63
21/06/2021	23:50:00	70	73	62	60	53	50	63	60	57	54	48	41	59	65
21/06/2021	23:55:00	**67**	**64**	**61**	**61**	**67**	**51**	63	59	57	55	50	41	60	**69**
22/06/2021	00:00:00	67	62	61	59	60	54	63	59	57	54	49	42	59	65
22/06/2021	00:05:00	68	62	60	61	70	59	63	59	57	54	49	41	59	72
22/06/2021	00:10:00	74	77	71	63	62	56	64	60	58	54	49	41	60	72
22/06/2021	00:15:00	72	61	60	60	52	45	63	58	56	54	48	39	58	62
22/06/2021	00:20:00	76	75	67	61	55	46	64	60	58	54	48	40	60	67
22/06/2021	00:25:00	67	61	61	61	55	51	63	59	56	53	48	40	59	63
22/06/2021	00:30:00	70	62	61	59	56	53	63	59	58	54	49	42	59	63
22/06/2021	00:35:00	67	64	60	58	53	48	63	58	56	53	47	41	58	62
22/06/2021	00:40:00	70	62	62	70	71	69	63	58	57	55	51	46	60	75
22/06/2021	00:45:00	66	61	60	58	52	52	62	58	56	53	47	37	58	61
22/06/2021	00:50:00	69	67	65	60	55	53	63	58	57	54	47	39	58	64
22/06/2021	00:55:00	70	62	59	58	55	54	62	58	56	54	47	38	58	62
22/06/2021	01:00:00	67	61	61	60	53	49	58	54	55	52	46	37	56	61
22/06/2021	01:05:00	63	58	57	59	51	50	52	49	49	49	43	34	52	60
22/06/2021	01:10:00	61	57	57	57	55	52	54	50	52	49	44	35	53	59
22/06/2021	01:15:00	66	60	55	57	51	43	50	47	45	48	42	32	50	59
22/06/2021	01:20:00	63	64	53	57	49	49	50	47	44	48	42	31	50	58
22/06/2021	01:25:00	65	60	58	57	51	49	58	53	52	50	44	34	54	60
22/06/2021	01:30:00	65	62	58	57	50	43	62	57	55	52	45	35	57	60
22/06/2021	01:35:00	66	60	58	57	55	53	62	57	55	52	45	35	57	62
22/06/2021	01:40:00	66	60	58	58	52	52	62	57	55	52	45	36	57	61
22/06/2021	01:45:00	68	64	64	60	54	49	63	58	58	53	47	39	58	64
22/06/2021	01:50:00	68	62	60	59	54	53	63	58	58	53	47	38	58	61
22/06/2021	01:55:00	68	61	60	58	51	47	62	57	56	53	46	36	57	61
22/06/2021	02:00:00	67	62	64	58	51	48	62	58	57	53	46	38	58	63
22/06/2021	02:05:00	66	61	60	59	53	52	62	58	56	52	46	37	57	61
22/06/2021	02:10:00	68	61	61	69	74	72	62	58	57	53	52	49	59	77
22/06/2021	02:15:00	65	61	60	58	53	44	62	58	57	53	46	37	58	61
22/06/2021	02:20:00	66	61	60	58	52	49	62	58	56	53	46	37	58	61
22/06/2021	02:25:00	67	63	61	62	55	49	62	58	57	53	47	38	58	64
22/06/2021	02:30:00	68	62	60	62	54	47	62	57	56	52	46	36	57	64
22/06/2021	02:35:00	66	61	60	58	52	49	62	58	57	53	46	38	58	61
22/06/2021	02:40:00	68	68	62	57	52	47	62	58	56	53	46	36	57	62
22/06/2021	02:45:00	68	63	60	59	52	48	62	58	57	53	46	38	58	62
22/06/2021	02:50:00	66	61	59	60	53	52	62	58	56	52	45	36	57	63
22/06/2021	02:55:00	68	63	61	59	54	48	62	58	57	53	47	38	58	62
22/06/2021	03:00:00	67	60	58	60	52	47	62	57	55	52	45	37	57	62
22/06/2021	03:05:00	66	61	60	58	52	48	62	58	57	53	46	37	58	61
22/06/2021	03:10:00	81	78	73	60	55	54	64	60	57	52	46	37	58	72
22/06/2021	03:15:00	66	61	60	59	54	46	62	58	57	53	46	38	58	62
22/06/2021	03:20:00	66	60	60	59	50	49	62	57	56	52	45	36	57	61
22/06/2021	03:25:00	66	61	60	58	53	53	62	58	57	52	46	38	58	62
22/06/2021	03:30:00	67	61	60	58	50	48	62	57	56	52	45	36	57	60
22/06/2021	03:35:00	66	61	60	57	50	47	62	58	57	53	46	37	58	60
22/06/2021	03:40:00	66	61	60	58	56	53	62	57	56	52	45	36	57	61
22/06/2021	03:45:00	68	62	61	58	52	45	62	58	57	52	46	37	58	62
22/06/2021	03:50:00	68	62	60	61	54	45	62	58	56	53	46	36	57	63

Background noise measurements at rear of 231 Watford Road,Harrow, HA1 3TU.

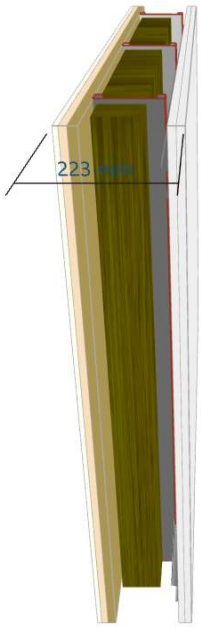
Date	Time	LZFmax 125	LZFmax 250	LZFmax 500	LZFmax 1000	LZFmax 2000	LZFmax 4000	LZeq 125	LZeq 250	LZeq 500	LZeq 1000	LZeq 2000	LZeq 4000	LAeq	LAFmax
22/06/2021	03:55:00	68	63	62	59	53	50	62	58	57	53	46	38	58	63
22/06/2021	04:00:00	67	61	60	58	54	54	62	58	56	53	46	37	57	62
22/06/2021	04:05:00	76	80	72	58	58	51	63	61	58	53	47	38	59	73
22/06/2021	04:10:00	67	60	61	60	53	45	62	57	56	52	46	37	57	63
22/06/2021	04:15:00	67	61	60	60	62	51	62	58	57	53	48	38	58	65
22/06/2021	04:20:00	66	65	60	57	54	51	62	58	56	52	46	37	57	63
22/06/2021	04:25:00	67	61	61	59	56	51	62	58	57	54	48	39	58	62
22/06/2021	04:30:00	65	61	58	61	52	49	62	58	55	53	46	38	57	62
22/06/2021	04:35:00	67	61	59	59	55	48	62	57	55	52	46	37	57	62
22/06/2021	04:40:00	69	61	58	58	55	45	62	58	55	52	46	36	57	61
22/06/2021	04:45:00	66	63	64	60	54	51	62	58	55	53	46	37	57	64
22/06/2021	04:50:00	65	61	58	59	53	50	62	58	55	53	46	37	57	61
22/06/2021	04:55:00	68	61	61	60	53	50	62	58	58	53	47	39	59	62
22/06/2021	05:00:00	66	61	61	60	54	45	59	55	54	52	45	36	56	63
22/06/2021	05:05:00	68	57	59	61	57	48	55	51	53	50	46	37	54	63
22/06/2021	05:10:00	65	68	59	58	53	47	53	51	48	51	45	37	53	61
22/06/2021	05:15:00	66	64	59	57	54	51	56	52	53	51	46	38	55	61
22/06/2021	05:20:00	74	62	58	59	54	56	57	50	47	52	47	38	54	61
22/06/2021	05:25:00	64	63	59	71	78	75	57	54	54	54	55	51	60	80
22/06/2021	05:30:00	76	71	63	62	57	56	63	59	56	54	49	38	59	64
22/06/2021	05:35:00	71	63	61	61	58	56	63	58	57	55	49	40	59	63
22/06/2021	05:40:00	79	77	66	65	59	53	64	59	56	55	49	40	59	72
22/06/2021	05:45:00	74	62	61	59	57	56	63	58	57	55	48	40	59	63
22/06/2021	05:50:00	66	63	60	61	61	58	62	58	56	55	49	39	59	64
22/06/2021	05:55:00	73	65	66	60	53	50	63	59	57	55	48	38	59	65
22/06/2021	06:00:00	70	62	61	60	60	51	62	58	56	55	49	38	59	63
22/06/2021	06:05:00	69	65	62	62	62	55	63	58	57	55	49	40	59	65
22/06/2021	06:10:00	71	66	61	60	54	48	63	59	57	56	50	39	59	62
22/06/2021	06:15:00	76	65	61	60	55	62	63	59	57	56	50	40	60	65
22/06/2021	06:20:00	69	64	62	60	54	50	63	59	57	55	49	39	59	63
22/06/2021	06:25:00	69	63	61	61	54	51	63	59	57	56	50	39	60	63
22/06/2021	06:30:00	71	63	61	60	55	58	63	59	57	56	50	40	60	63
22/06/2021	06:35:00	70	65	64	61	58	49	63	59	57	56	50	39	60	65
22/06/2021	06:40:00	68	62	61	62	56	52	63	59	58	57	51	40	60	64
22/06/2021	06:45:00	68	65	63	60	55	48	63	59	57	56	51	40	60	64
22/06/2021	06:50:00	77	79	79	77	71	67	64	60	58	57	51	44	61	81
22/06/2021	06:55:00	72	68	64	60	54	55	63	59	56	56	50	40	60	64
22/06/2021	07:00:00	68	78	64	61	54	46	64	60	57	56	50	40	60	71
22/06/2021	07:05:00	70	66	61	65	65	53	64	60	56	55	49	40	59	69
22/06/2021	07:10:00	75	71	61	59	59	64	65	59	56	56	49	41	59	66
22/06/2021	07:15:00	69	68	62	67	67	60	63	60	58	57	52	43	61	69
22/06/2021	07:20:00	69	62	60	61	61	54	64	59	56	56	50	40	60	65
22/06/2021	07:25:00	76	69	63	60	58	53	64	59	58	56	51	41	60	64
22/06/2021	07:30:00	74	66	60	58	57	52	64	59	56	55	49	40	59	63
22/06/2021	07:35:00	81	76	66	64	65	50	67	62	58	57	51	40	61	69
22/06/2021	07:40:00	68	65	60	66	69	67	64	59	56	55	51	42	59	73
22/06/2021	07:45:00	74	76	67	64	66	61	64	60	58	56	50	41	60	69
22/06/2021	07:50:00	71	72	59	61	60	55	63	59	55	54	49	40	58	64
22/06/2021	07:55:00	79	74	65	59	54	52	62	56	54	54	49	39	58	67
22/06/2021	08:00:00	72	72	71	64	57	57	63	59	57	56	50	39	59	70
22/06/2021	08:05:00	69	67	61	60	55	53	63	59	57	56	50	39	60	62
22/06/2021	08:10:00	68	63	61	59	62	63	64	59	57	55	51	45	60	66
22/06/2021	08:15:00	69	62	60	60	62	55	63	59	56	56	51	41	60	65
22/06/2021	08:20:00	73	68	62	61	68	56	65	59	58	55	51	41	60	71
22/06/2021	08:25:00	69	63	60	58	65	61	64	59	56	54	52	43	59	68
22/06/2021	08:30:00	70	66	62	59	65	59	63	59	58	55	52	44	60	68
22/06/2021	08:35:00	80	63	59	59	62	58	64	58	56	55	50	42	59	66
22/06/2021	08:40:00	77	67	61	63	62	66	64	59	57	56	51	43	60	68
22/06/2021	08:45:00	69	62	60	58	55	57	63	58	56	54	49	40	59	62
22/06/2021	08:50:00	68	62	59	73	78	74	62	57	56	55	55	52	61	80
22/06/2021	08:55:00	68	67	65	63	60	55	58	55	53	54	48	38	57	66
22/06/2021	09:00:00	69	62	60	60	58	52	63	58	56	55	49	40	59	63
22/06/2021	09:05:00	65	61	60	60	61	56	58	54	52	54	49	40	57	64
22/06/2021	09:10:00	69	69	65	62	58	55	59	56	55	55	49	40	58	65
22/06/2021	09:15:00	76	72	67	73	75	70	61	57	54	57	55	51	61	77
22/06/2021	09:20:00	70	65	60	61	57	53	59	56	54	55	50	40	58	64
22/06/2021	09:25:00	67	60	61	59	55	58	57	54	53	54	48	38	57	62
22/06/2021	09:30:00	68	64	64	60	57	47	62	58	56	55	49	39	59	65
22/06/2021	09:35:00	72	67	62	60	55	62	64	59	57	56	50	40	60	65
22/06/2021	09:40:00	71	63	61	61	60	53	64	59	57	56	50	39	59	64
22/06/2021	09:45:00	71	63	61	60	59	48	64	59	58	56	50	41	60	62
22/06/2021	09:50:00	69	64	61	60	55	64	64	58	57	56	50	41	59	65
22/06/2021	09:55:00	69	63	64	67	65	58	64	59	57	56	51	42	60	69
22/06/2021	10:00:00	71	67	65	79	67	53	64	59	57	60	52	40	62	80
22/06/2021	10:05:00	81	71	67	61	53	45	64	60	57	55	49	39	59	67
22/06/2021	10:10:00	71	63	62	59	59	51	64	59	56	55	50	40	59	63
22/06/2021	10:15:00	76	63	63	70	77	65	64	58	56	57	55	48	61	79
22/06/2021	10:20:00	77	69	61	73	79	70	64	59	57	57	56	49	62	80
22/06/2021	10:25:00	70	63	66	68	75	72	63	58	56	56	54	50	61	77
22/06/2021	10:30:00	77	68	64	72	74	71	65	59	57	57	53	50	61	78
22/06/2021	10:35:00	69	66	65	60	56	50	66	60	59	56	50	41	61	66
22/06/2021	10:40:00	74	74	66	64	54	54	66	61	58	56	50	40	61	69
22/06/2021	10:45:00	70	65	61	60	60	57	65	60	58	56	50	44	60	65
22/06/2021	10:50:00	71	67	62	61	61	59	66	61	58	56	51	44	61	66
22/06/2021	10:55:00	70	65	63	60	60	59	66	61	59	56	50	43	61	65
22/06/2021	11:00:00	75	72	62	66	60	54	66	62	58	56	50	45	61	68
22/06/2021	11:05:00	85	88	87	80	74	62	69	67	64	59	54	44	65	86
22/06/2021	11:10:00	70	67	63	62	57	52	67	61	58	56	50	42	60	65
22/06/2021	11:15:00	71	74	63	61	62	57	67	62	59	56	50	43	61	67
22/06/2021	11:20:00	71	66	62	64	69	68	67	62	58	56	54	50	62	72
22/06/2021	11:25:00	70	64	63	61	62	63	67	62	59	57	51	45	62	67
22/06/2021	11:28:00	77	72	67	68	67	63	68	62	58	55	53	48	62	72
	Rear		LZeq	LZeq	LZeq	LZeq	LZeq	LZeq							
		LAeq	125	250	500	1000	2000	4000							
	day	62	67	61	59	57	53	47							
	night	58	62	58	56	54	48	40							
			LZFmax	LZFmax	LZFmax	LZFmax	LZFmax	LZFmax							
		LAFmax	125	250	500	1000	2000	4000							
		69	67	64	61	61	67	51							

Appendix B

Sound Insulation Prediction (v9.0.8)

margin of error is generally within Rw +/- 3 dB
- Key No. 2501
Job Name:231 Watford Rod
Job No.:104170 Initials:AD
Date.:22/07/2021
File Name:Insu'

Notes:external wall



Rw	69 dB
C	-2 dB
Ctr	-7 dB

Mass-air-mass resonant frequency = =33 Hz
Panel Size = 2.7 m x 4.0 m
Partition surface mass = 69.5 kg/m²

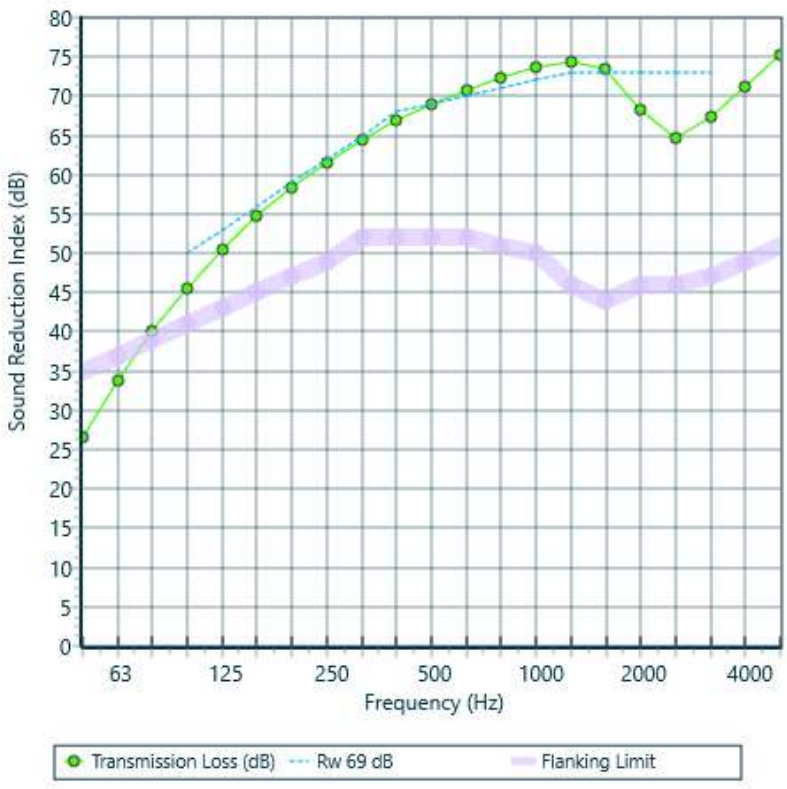
System description

Panel 1 : 1 x 10 mm mm NuClad + 1 x 15 mm Plywood
+ 1 x 18 mm RCM CemBoard (cement particle board)

Frame: Steel Stud + resil. rail; Cavity Width 150 mm ,Stud spacing 600 mm , 1 x Fibreglass (22kg/m3) Thickness 100 mm
Panel 2 + 2 x 15 mm Gyproc SoundBloc 15mm

Floor Cover: Thickness 0.02 mm

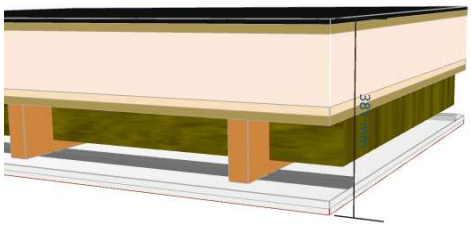
freq.(Hz)	TL(dB)	TL(dB)
50	26	
63	34	30
80	40	
100	46	
125	50	49
160	55	
200	58	
250	62	61
315	64	
400	67	
500	69	69
630	71	
800	72	
1000	74	73
1250	74	
1600	73	
2000	68	68
2500	65	
3150	67	
4000	71	70
5000	75	



Sound Insulation Prediction (v9.0.8)

Program copyright Marshall Day Acoustics 2017
margin of error is generally within Rw +/- 3 dB
- Key No. 2501
Job Name:231 Watford Road
Job No.:104170 Initials:AD
Date.:22/07/2021
File Name:Insu'

Notes:roof construction



Rw	68 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 = 107 kg/m²

System description

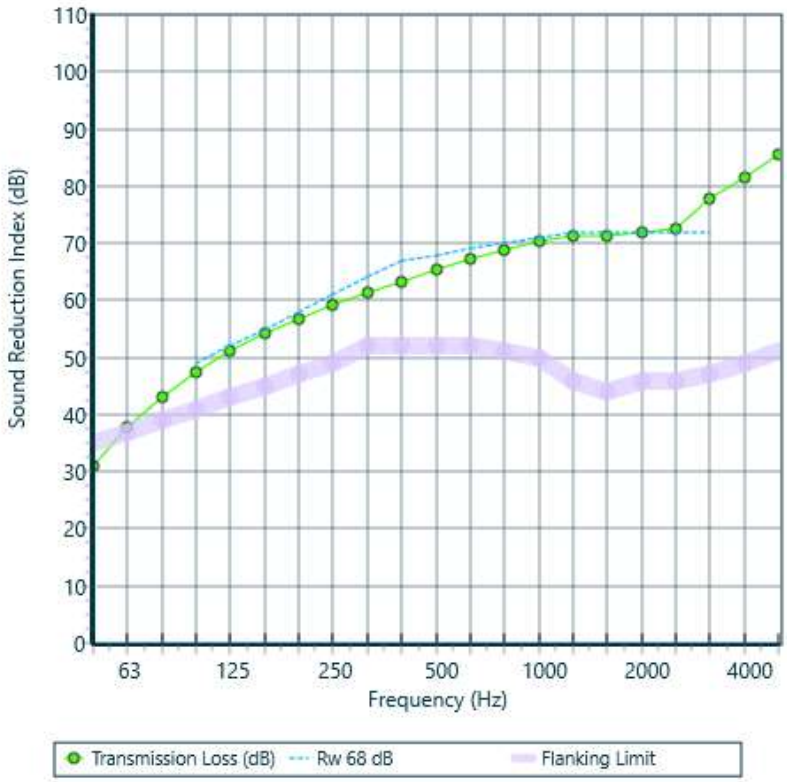
Panel 1 : 1 x 10 mm Nuraply waterproof membrane
+ 1 x 139.9 mm Kingspan KS 1000AWP 120/140mm
+ 1 x 18 mm RCM CemBoard (cement particle board)
+ 1 x 18 mm RCM CemBoard (cement particle board)
+ 1 x 17.5 mm Plywood

Frame: Solid Joist with resilient rail; Cavity Width 150 mm ,Stud spacing 600 mm , 1 x Fibreglass (10kg/m3) Thickness 100 mm

Panel 2 + 1 x 15 mm Gyproc SoundBloc 15mm
+ 1 x 12.5 mm Gyproc SoundBloc 12.5mm

Floor Cover: Thickness 0.02 mm

freq.(Hz)	TL(dB)	TL(dB)
50	31	
63	38	35
80	43	
100	47	
125	51	50
160	54	
200	57	
250	59	59
315	61	
400	63	
500	65	65
630	67	
800	69	
1000	70	70
1250	71	
1600	71	
2000	72	72
2500	73	
3150	78	
4000	82	80
5000	86	



Appendix C

00 F Lounge 2V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	9	11	13	13	12	12

Derivation	Term	Value
Façade area (including window)	S_f	27
Window area	S_{wi}	9
$S_f - S_{wi}$	S_{ew}	18
Area of ceiling	S_{rr}	24
$S_f + S_{rr}$	S	51
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	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00003	0.00004	0.00001	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00036	0.00036	0.00005	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	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	-34	-34	-41	-43	-47	-53
Total Absorption Area of Receiver Room	A (furnished)		9	11	13	13	12	12
	10Log(S/A)	G	7.5	6.6	5.9	5.9	6.3	6.3
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	44.0	38.4	26.9	28.0	21.1	11.0

RESULTANT INTERNAL NOISE LEVEL	**34**

00 F Lounge 1V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 1No. TALH&M vent	$D_{ne,w}$	Dne,w 39dB	42	39	36	44	52	58
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	9	11	13	13	12	12

Derivation	Term	Value
Façade area (including window)	S_f	27
Window area	S_{wi}	9
$S_f - S_{wi}$	S_{ew}	18
Area of ceiling	S_{rr}	24
$S_f + S_{rr}$	S	51
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	68	63	59	62	59	55
Passive vent - 1No. TALH&M vent	$D_{n,e}$		41.87121255	39.17121255	36.47121255	44.27121255	52.37121255	58.17121255
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00004	0.00001	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00036	0.00036	0.00005	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	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	-34	-34	-40	-48	-51	-59
Total Absorption Area of Receiver Room	A (furnished)		9	11	13	13	12	12
	10Log(S/A)	G	7.5	6.6	5.9	5.9	6.3	6.3
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	44.1	38.6	27.9	23.1	17.5	5.6

RESULTANT INTERNAL NOISE LEVEL	**33**

00 F Lounge 4V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 4No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	42	41	36	34	39	44
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	9	11	13	13	12	12

Derivation	Term	Value
Façade area (including window)	S_f	27
Window area	S_{wi}	9
$S_f - S_{wi}$	S_{ew}	18
Area of ceiling	S_{rr}	24
$S_f + S_{rr}$	S	51
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	68	63	59	62	59	55
Passive vent - 4No. TAL4H&M vent	$D_{n,e}$		42.35061263	41.05061263	35.75061263	33.65061263	38.95061263	44.25061263
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00005	0.00008	0.00002	0.00001
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00036	0.00036	0.00005	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	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	-34	-34	-40	-40	-45	-51
Total Absorption Area of Receiver Room	A (furnished)		9	11	13	13	12	12
	10Log(S/A)	G	7.5	6.6	5.9	5.9	6.3	6.3
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	44.1	38.5	28.3	30.6	23.3	13.4

RESULTANT INTERNAL NOISE LEVEL	**35**

00 F Lounge 2V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 2No. TALH&M vent	$D_{ne,w}$	Dne,w 39dB	39	36	33	41	49	55
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	9	11	13	13	12	12

Derivation	Term	Value
Façade area (including window)	S_f	27
Window area	S_{wi}	9
$S_f - S_{wi}$	S_{ew}	18
Area of ceiling	S_{rr}	24
$S_f + S_{rr}$	S	51
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	68	63	59	62	59	55
Passive vent - 2No. TALH&M vent	$D_{n,e}$		38.86091259	36.16091259	33.46091259	41.26091259	49.36091259	55.16091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00003	0.00005	0.00009	0.00001	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00036	0.00036	0.00005	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	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	-34	-34	-39	-46	-50	-58
Total Absorption Area of Receiver Room	A (furnished)		9	11	13	13	12	12
	10Log(S/A)	G	7.5	6.6	5.9	5.9	6.3	6.3
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	44.2	38.9	29.6	24.7	18.0	6.4

RESULTANT INTERNAL NOISE LEVEL	**34**

00 F Bedroom day

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 10mm float / 24mm / 20.5mm LG	R_w	Rw 48dB	38	42	51	48	49	64
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	5	7	9	9	8	8

Derivation	Term	Value
Façade area (including window)	S_f	13
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	11
Area of ceiling	S_{rr}	11
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	28

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	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00006	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		38	42	51	48	49	64
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	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	-43	-47	-42	-40	-45	-51
Total Absorption Area of Receiver Room	A (furnished)		5	7	9	9	8	8
	10Log(S/A)	G	6.8	5.3	4.2	4.2	4.7	4.7
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	34.5	24.9	24.2	28.9	21.1	11.8

RESULTANT INTERNAL NOISE LEVEL	**31**

00 F Bedroom night

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	59	56	58	53	46
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 10mm float / 24mm / 20.5mm LG	R_w	Rw 48dB	38	42	51	48	49	64
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	5	7	9	9	8	8

Derivation	Term	Value
Façade area (including window)	S_f	13
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	11
Area of ceiling	S_{rr}	11
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	28

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	63	59	56	58	53	46
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00006	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		38	42	51	48	49	64
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	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	-43	-47	-42	-40	-45	-51
Total Absorption Area of Receiver Room	A (furnished)		5	7	9	9	8	8
	10Log(S/A)	G	6.8	5.3	4.2	4.2	4.7	4.7
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	29.4	20.5	20.4	24.7	14.7	2.4

RESULTANT INTERNAL NOISE LEVEL	**26**

00 F Bedroom Lamax

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$Lmax_{,ff}$	80dBA	86	85	76	72	70	55
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 10mm float / 24mm / 20.5mm LG	R_w	Rw 48dB	38	42	51	48	49	64
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	5	7	9	9	8	8

Derivation	Term	Value
Façade area (including window)	S_f	13
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	11
Area of ceiling	S_{rr}	11
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	28

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	86	85	76	72	70	55
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00006	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		38	42	51	48	49	64
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	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	-43	-47	-42	-40	-45	-51
Total Absorption Area of Receiver Room	A (furnished)		5	7	9	9	8	8
	10Log(S/A)	G	6.8	5.3	4.2	4.2	4.7	4.7
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	53.3	46.9	40.9	38.6	32.1	11.6

RESULTANT INTERNAL NOISE LEVEL	**44**

00 R Lounge 2V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	10	12	14	14	13	13

Derivation	Term	Value
Façade area (including window)	S_f	11
Window area	S_{wi}	5
$S_f - S_{wi}$	S_{ew}	6
Area of ceiling	S_{rr}	26
$S_f + S_{rr}$	S	37
Reference absorption area	A_0	10
Room volume	V	65

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	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00004	0.00006	0.00002	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00026	0.00033	0.00021	0.00003	0.00003	0.00017
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00001	0.00000	0.00000	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	-36	-35	-36	-41	-43	-38
Total Absorption Area of Receiver Room	A (furnished)		10	12	14	14	13	13
	10Log(S/A)	G	5.6	4.8	4.1	4.1	4.4	4.4
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	35.6	31.2	25.5	23.4	18.4	19.7

RESULTANT INTERNAL NOISE LEVEL	**29**

00 R Lounge 1V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 1No. TALH&M vent	$D_{ne,w}$	Dne,w 39dB	42	39	36	44	52	58
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	10	12	14	14	13	13

Derivation	Term	Value
Façade area (including window)	S_f	11
Window area	S_{wi}	5
$S_f - S_{wi}$	S_{ew}	6
Area of ceiling	S_{rr}	26
$S_f + S_{rr}$	S	37
Reference absorption area	A_0	10
Room volume	V	65

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	63	58	54	57	54	50
Passive vent - 1No. TALH&M vent	$D_{n,e}$		41.87121255	39.17121255	36.47121255	44.27121255	52.37121255	58.17121255
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00002	0.00003	0.00006	0.00001	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00026	0.00033	0.00021	0.00003	0.00003	0.00017
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00001	0.00000	0.00000	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	-35	-34	-36	-44	-45	-38
Total Absorption Area of Receiver Room	A (furnished)		10	12	14	14	13	13
	10Log(S/A)	G	5.6	4.8	4.1	4.1	4.4	4.4
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	35.8	31.5	25.9	19.7	16.7	19.6

RESULTANT INTERNAL NOISE LEVEL	**29**

00 R Lounge 4V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 4No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	42	41	36	34	39	44
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	10	12	14	14	13	13

Derivation	Term	Value
Façade area (including window)	S_f	11
Window area	S_{wi}	5
$S_f - S_{wi}$	S_{ew}	6
Area of ceiling	S_{rr}	26
$S_f + S_{rr}$	S	37
Reference absorption area	A_0	10
Room volume	V	65

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	63	58	54	57	54	50
Passive vent - 4No. TAL4H&M vent	$D_{n,e}$		42.35061263	41.05061263	35.75061263	33.65061263	38.95061263	44.25061263
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00002	0.00002	0.00007	0.00012	0.00003	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00026	0.00033	0.00021	0.00003	0.00003	0.00017
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00001	0.00000	0.00000	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	-35	-35	-36	-38	-42	-38
Total Absorption Area of Receiver Room	A (furnished)		10	12	14	14	13	13
	10Log(S/A)	G	5.6	4.8	4.1	4.1	4.4	4.4
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	35.8	31.4	26.1	25.7	19.6	19.8

RESULTANT INTERNAL NOISE LEVEL	**30**

00 R Lounge 2V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 2No. TALH&M vent	$D_{ne,w}$	Dne,w 39dB	39	36	33	41	49	55
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	10	12	14	14	13	13

Derivation	Term	Value
Façade area (including window)	S_f	11
Window area	S_{wi}	5
$S_f - S_{wi}$	S_{ew}	6
Area of ceiling	S_{rr}	26
$S_f + S_{rr}$	S	37
Reference absorption area	A_0	10
Room volume	V	65

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	63	58	54	57	54	50
Passive vent - 2No. TALH&M vent	$D_{n,e}$		38.86091259	36.16091259	33.46091259	41.26091259	49.36091259	55.16091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00004	0.00007	0.00012	0.00002	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00026	0.00033	0.00021	0.00003	0.00003	0.00017
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00001	0.00000	0.00000	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	-35	-34	-35	-43	-44	-38
Total Absorption Area of Receiver Room	A (furnished)		10	12	14	14	13	13
	10Log(S/A)	G	5.6	4.8	4.1	4.1	4.4	4.4
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	36.0	31.9	26.8	20.8	16.9	19.6

RESULTANT INTERNAL NOISE LEVEL	**29**

00 R Bedroom day

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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}	5
$S_f - S_{wi}$	S_{ew}	15
Area of ceiling	S_{rr}	15
$S_f + S_{rr}$	S	35
Reference absorption area	A_0	10
Room volume	V	38

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	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00004	0.00006	0.00002	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00028	0.00035	0.00022	0.00003	0.00003	0.00017
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	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	-35	-34	-36	-40	-43	-37
Total Absorption Area of Receiver Room	A (furnished)		8	10	12	12	11	11
	10Log(S/A)	G	6.3	5.3	4.5	4.5	4.9	4.9
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	36.8	32.0	26.1	24.1	19.1	20.4

RESULTANT INTERNAL NOISE LEVEL	**30**

00 R Bedroom night

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	56dBA	58	54	51	53	48	41
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	5	7	9	9	8	8

Derivation	Term	Value
Façade area (including window)	S_f	13
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	11
Area of ceiling	S_{rr}	11
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	28

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	51	53	48	41
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00006	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00012	0.00015	0.00009	0.00001	0.00001	0.00007
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	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	-38	-38	-38	-40	-44	-41
Total Absorption Area of Receiver Room	A (furnished)		5	7	9	9	8	8
	10Log(S/A)	G	6.8	5.3	4.2	4.2	4.7	4.7
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	29.4	24.2	19.7	20.2	11.5	7.4

RESULTANT INTERNAL NOISE LEVEL	**24**

00 R Bedroom Lamax

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$Lmax_{,ff}$	70dBA	67	64	61	61	67	51
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
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	5	7	9	9	8	8

Derivation	Term	Value
Façade area (including window)	S_f	13
Window area	S_{wi}	1
$S_f - S_{wi}$	S_{ew}	11
Area of ceiling	S_{rr}	11
$S_f + S_{rr}$	S	24
Reference absorption area	A_0	10
Room volume	V	28

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	67	64	61	61	67	51
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00006	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00012	0.00015	0.00009	0.00001	0.00001	0.00007
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	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	-38	-38	-38	-40	-44	-41
Total Absorption Area of Receiver Room	A (furnished)		5	7	9	9	8	8
	10Log(S/A)	G	6.8	5.3	4.2	4.2	4.7	4.7
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	38.5	34.8	29.7	28.6	31.2	17.6

RESULTANT INTERNAL NOISE LEVEL	**36**

04 F Lounge 2V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	32
Window area	S_{wi}	10
$S_f - S_{wi}$	S_{ew}	22
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	62
Reference absorption area	A_0	10
Room volume	V	75

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	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00000	0.00001	0.00002	0.00003	0.00001	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00031	0.00031	0.00004	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-34	-35	-42	-44	-48	-54
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.0	6.4	5.8	5.8	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	43.1	37.5	26.1	27.1	20.2	10.0

RESULTANT INTERNAL NOISE LEVEL	**33**

04 F Lounge 1V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 1No. TALH&M vent	$D_{ne,w}$	Dne,w 39dB	42	39	36	44	52	58
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	32
Window area	S_{wi}	10
$S_f - S_{wi}$	S_{ew}	22
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	62
Reference absorption area	A_0	10
Room volume	V	75

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	68	63	59	62	59	55
Passive vent - 1No. TALH&M vent	$D_{n,e}$		41.87121255	39.17121255	36.47121255	44.27121255	52.37121255	58.17121255
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00004	0.00001	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00031	0.00031	0.00004	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-34	-35	-41	-49	-51	-59
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.0	6.4	5.8	5.8	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	43.2	37.7	27.1	22.3	16.7	4.8

RESULTANT INTERNAL NOISE LEVEL	**33**

04 F Lounge 4V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 4No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	42	41	36	34	39	44
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	32
Window area	S_{wi}	10
$S_f - S_{wi}$	S_{ew}	22
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	62
Reference absorption area	A_0	10
Room volume	V	75

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	68	63	59	62	59	55
Passive vent - 4No. TAL4H&M vent	$D_{n,e}$		42.35061263	41.05061263	35.75061263	33.65061263	38.95061263	44.25061263
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00004	0.00007	0.00002	0.00001
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00031	0.00031	0.00004	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-34	-35	-41	-41	-46	-52
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.0	6.4	5.8	5.8	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	43.2	37.6	27.4	29.7	22.3	12.5

RESULTANT INTERNAL NOISE LEVEL	**34**

04 F Lounge 2V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 2No. TALH&M vent	$D_{ne,w}$	Dne,w 38dB	39	36	33	41	49	55
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	32
Window area	S_{wi}	10
$S_f - S_{wi}$	S_{ew}	22
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	62
Reference absorption area	A_0	10
Room volume	V	75

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	68	63	59	62	59	55
Passive vent - 2No. TALH&M vent	$D_{n,e}$		38.86091259	36.16091259	33.46091259	41.26091259	49.36091259	55.16091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00002	0.00004	0.00007	0.00001	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00031	0.00031	0.00004	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-34	-35	-39	-47	-51	-58
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.0	6.4	5.8	5.8	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	43.3	37.9	28.8	23.8	17.2	5.6

RESULTANT INTERNAL NOISE LEVEL	**33**

04 F Bedroom day

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	66dBA	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 10mm float / 24mm / 20.5mm LG	R_w	Rw 48dB	38	42	51	48	49	64
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
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	13
Window area	S_{wi}	4
S_f -S_{wi}	S_{ew}	9
Area of ceiling	S_{rr}	12
S_f +S_{rr}	S	25
Reference absorption area	A_0	10
Room volume	V	30

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	68	63	59	62	59	55
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00005	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		38	42	51	48	49	64
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00003	0.00001	0.00000	0.00000	0.00000	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-41	-45	-43	-41	-46	-51
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9
	10Log(S/A)	G	6.4	5.1	4.1	4.1	4.6	4.6
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	36.3	26.1	24.0	28.6	20.9	11.4

RESULTANT INTERNAL NOISE LEVEL	**31**

04 F Bedroom night

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	59	56	58	53	46
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 10mm float / 24mm / 20.5mm LG	R_w	Rw 48dB	38	42	51	48	49	64
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
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	13
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	9
Area of ceiling	S_{rr}	12
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	30

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	63	59	56	58	53	46
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00005	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		38	42	51	48	49	64
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00003	0.00001	0.00000	0.00000	0.00000	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-41	-45	-43	-41	-46	-51
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9
	10Log(S/A)	G	6.4	5.1	4.1	4.1	4.6	4.6
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	31.2	21.7	20.2	24.4	14.5	2.0

RESULTANT INTERNAL NOISE LEVEL	**26**

04 F Bedroom Lamax

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$Lmax_{,ff}$	80dBA	86	85	76	72	70	55
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 10mm float / 24mm / 20.5mm LG	R_w	Rw 48dB	38	42	51	48	49	64
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
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	13
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	9
Area of ceiling	S_{rr}	12
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	30

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	86	85	76	72	70	55
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00005	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		38	42	51	48	49	64
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00003	0.00001	0.00000	0.00000	0.00000	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-41	-45	-43	-41	-46	-51
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9
	10Log(S/A)	G	6.4	5.1	4.1	4.1	4.6	4.6
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	55.1	48.1	40.7	38.3	32.0	11.1

RESULTANT INTERNAL NOISE LEVEL	**45.0**

04 R Lounge 2V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	33
Window area	S_{wi}	8
$S_f - S_{wi}$	S_{ew}	25
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	63
Reference absorption area	A_0	10
Room volume	V	75

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	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00000	0.00001	0.00002	0.00003	0.00001	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00025	0.00025	0.00003	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-35	-36	-43	-44	-48	-54
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.1	6.4	5.9	5.9	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	37.6	31.8	20.7	22.0	15.0	4.9

RESULTANT INTERNAL NOISE LEVEL	**28**

04 R Lounge 1V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 1No. TALH&M vent	$D_{ne,w}$	Dne,w 39dB	42	39	36	44	52	58
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	33
Window area	S_{wi}	8
S_f -S_{wi}	S_{ew}	25
Area of ceiling	S_{rr}	30
S_f +S_{rr}	S	63
Reference absorption area	A_0	10
Room volume	V	75

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	63	58	54	57	54	50
Passive vent - 1No. TALH&M vent	$D_{n,e}$		41.87121255	39.17121255	36.47121255	44.27121255	52.37121255	58.17121255
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00004	0.00001	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00025	0.00025	0.00003	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-35	-36	-42	-49	-52	-60
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.1	6.4	5.9	5.9	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	37.6	32.0	21.7	16.9	11.1	-0.5

RESULTANT INTERNAL NOISE LEVEL	**27**

04 R Lounge 4V 9x3

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 4No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	42	41	36	34	39	44
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	33
Window area	S_{wi}	8
$S_f - S_{wi}$	S_{ew}	25
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	63
Reference absorption area	A_0	10
Room volume	V	75

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	63	58	54	57	54	50
Passive vent - 4No. TAL4H&M vent	$D_{n,e}$		42.35061263	41.05061263	35.75061263	33.65061263	38.95061263	44.25061263
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00001	0.00004	0.00007	0.00002	0.00001
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00025	0.00025	0.00003	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-35	-36	-41	-41	-46	-52
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.1	6.4	5.9	5.9	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	37.6	31.9	22.1	24.6	17.1	7.4

RESULTANT INTERNAL NOISE LEVEL	**29**

04 R Lounge 2V 9x6

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 2No. TALH&M vent	$D_{ne,w}$	Dne,w 39dB	39	36	33	41	49	55
Glazing 6.5mm LG / 10mm / 6mm Float	R_w	Rw 39dB	27	27	36	43	44	53
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
Total room absorption (based on RT)	RT_{60}	0.75	12	14	16	16	15	15

Derivation	Term	Value
Façade area (including window)	S_f	33
Window area	S_{wi}	8
$S_f - S_{wi}$	S_{ew}	25
Area of ceiling	S_{rr}	30
$S_f + S_{rr}$	S	63
Reference absorption area	A_0	10
Room volume	V	75

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	63	58	54	57	54	50
Passive vent - 2No. TALH&M vent	$D_{n,e}$		38.86091259	36.16091259	33.46091259	41.26091259	49.36091259	55.16091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00002	0.00004	0.00007	0.00001	0.00000	0.00000
Double Glazed Windows	R_{wi}		27	27	36	43	44	53
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00025	0.00025	0.00003	0.00001	0.00001	0.00000
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00003	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-35	-35	-40	-47	-51	-59
Total Absorption Area of Receiver Room	A (furnished)		12	14	16	16	15	15
	10Log(S/A)	G	7.1	6.4	5.9	5.9	6.1	6.1
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	37.8	32.3	23.5	18.5	11.7	0.3

RESULTANT INTERNAL NOISE LEVEL	**28**

04 R Bedroom day

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	61dBA	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
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	13
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	9
Area of ceiling	S_{rr}	12
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	30

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	63	58	54	57	54	50
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00005	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00034	0.00043	0.00027	0.00003	0.00004	0.00021
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-34	-33	-35	-39	-42	-37
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9
	10Log(S/A)	G	6.4	5.1	4.1	4.1	4.6	4.6
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	38.0	32.7	26.7	24.9	19.8	21.0

RESULTANT INTERNAL NOISE LEVEL	**31**

04 R Bedroom night

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$L_{eq,ff}$	56dBA	58	54	51	53	48	41
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
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	13
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	9
Area of ceiling	S_{rr}	12
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	30

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	51	53	48	41
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00005	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00034	0.00043	0.00027	0.00003	0.00004	0.00021
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-34	-33	-35	-39	-42	-37
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9
	10Log(S/A)	G	6.4	5.1	4.1	4.1	4.6	4.6
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	32.9	28.3	22.9	20.7	13.4	11.6

RESULTANT INTERNAL NOISE LEVEL	**26**

04 R Bedroom Lamax

ACOUSTICS PLUS

Description	Term	Weighted rating	Octave Band Centre Frequency (Hz)					
			125	250	500	1000	2000	4000
Freefield External Noise Level	$Lmax_{,ff}$	70dBA	67	64	61	61	67	51
Passive vent - 2No. TAL4H&M vent	$D_{ne,w}$	Dne,w 38dB	45	44	39	37	42	47
Glazing 6mm float / 10mm / 4mm float	R_w	Rw 34dB	27	26	28	37	36	29
External wall - modular steel framework	R_{ew}	R_w 69dB	42	54	62	67	61	63
Roof - warm roof	R_{rr}	R_w 68dB	43	52	58	63	65	73
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	13
Window area	S_{wi}	4
$S_f - S_{wi}$	S_{ew}	9
Area of ceiling	S_{rr}	12
$S_f + S_{rr}$	S	25
Reference absorption area	A_0	10
Room volume	V	30

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	67	64	61	61	67	51
Passive vent - 2No. TAL4H&M vent	$D_{n,e}$		45.36091259	44.06091259	38.76091259	36.66091259	41.96091259	47.26091259
	$(A_0/S)*10^{(-D_{ne,w}/10)}$	B	0.00001	0.00002	0.00005	0.00009	0.00003	0.00001
Double Glazed Windows	R_{wi}		27	26	28	37	36	29
	$(S_{wi}/S)*10^{(-R_{wi}/10)}$	C	0.00034	0.00043	0.00027	0.00003	0.00004	0.00021
External Wall Construction	R_{ew}		42	54	62	67	61	63
	$(S_{ew}/S)*10^{(-R_{ew}/10)}$	D	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Roof Construction	R_{rr}		43	52	58	63	65	73
	$(S_{rr}/S)*10^{(-R_{rr}/10)}$	E	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000
Total Sound Insulation Performance	10Log(B+C+D+E)	F	-34	-33	-35	-39	-42	-37
Total Absorption Area of Receiver Room	A (furnished)		6	8	10	10	9	9
	10Log(S/A)	G	6.4	5.1	4.1	4.1	4.6	4.6
Total Internal Sound Pressure Level, Leq	Leq,2	A+F+G+3	42.1	38.9	32.9	29.2	33.1	21.8

RESULTANT INTERNAL NOISE LEVEL	**38**

Appendix D

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					

Friday, April 16, 2021 | Acoustic database 20190508

Acoustic Performance

Glazing Configuration

6.5mm (33.1) LamiGlass Sound Reduction

10mm Cavity

6mm Float Glass

.

Sound Reduction Indices

Frequency, Hz / dB						Rw	C	Ctr	OITC	STC
125	250	500	1000	2000	4000	39	-1	-5	32	39
27	27	36	43	44	53					

Thursday, July 22, 2021 | Acoustic database 20190508

Acoustic Performance

Glazing Configuration

10mm Float Glass

24mm Cavity

20.5mm (1010.1) LamiGlass Sound Reduction

.

Sound Reduction Indices

Frequency, Hz / dB						Rw	C	Ctr	OITC	STC
125	250	500	1000	2000	4000	48	-2	-6	37	49
38	42	51	48	49	64					

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, Rw, and adaptation terms, C and Ctr, 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.

UKAS TESTING
0578

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

Filler wall area: 9.8 m²
Description:
TAL4H&M ventilator assembly;
x1 MFAB, TAL4000 AirLiner, HM43F Internal (OPEN)

Source room volume: 130 m³
Receive room volume: 115 m³
Air temperature: 19 °C
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	o
63	1.76	18.0	100.5	69.6	32.0	o
80	1.98	15.8	99.6	65.1	36.1	o
100	1.69	16.2	100.1	59.6	41.5	o
125	1.98	8.6	102.8	60.8	43.6	o
160	1.74	15.4	102.1	59.8	42.5	x
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) dB**

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

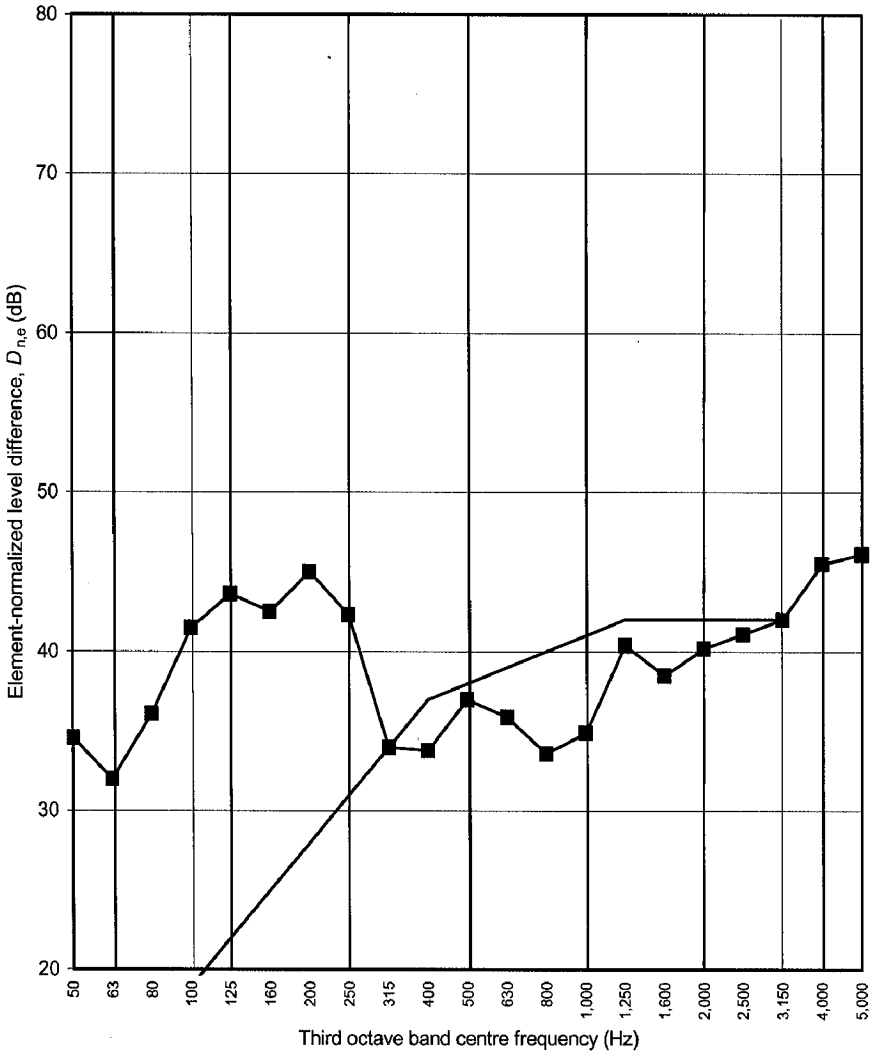
0578

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

Filler wall area: 9.8 m²
Description:
TAL4H&M ventilator assembly;
x1 MFAB, TAL4000 AirLiner, HM43F Internal (OPEN)

Source room volume: 130 m³
Receive room volume: 115 m³
Air temperature: 19 °C
Air relative humidity: 71 %

Frequency (Hz)	$D_{n,e}$ One-third octave (dB)	
50	34.6	o
63	32.0	o
80	36.1	o
100	41.5	o
125	43.6	o
160	42.5	x
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) dB

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

UKAS TESTING
0578

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:** L107-150 **Test element:** Ventilator

Filler wall area: 9.8 m²
Description:
TAL4H&M ventilator assembly;
x1 MFAB, TAL4000 AirLiner, HM43F Internal (CLOSED)

Source room volume: 130 m³
Receive room volume: 115 m³
Air temperature: 19 °C
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	25.9	91.8	60.0	34.6	o
63	1.76	18.9	100.5	69.3	32.2	o
80	1.98	15.0	99.7	64.8	36.6	o
100	1.69	17.1	100.4	59.2	42.1	o
125	1.98	8.5	102.9	60.2	44.3	o
160	1.74	16.7	102.0	59.2	43.1	x
200	2.00	32.5	102.2	57.1	45.5	
250	1.80	11.7	100.2	57.3	42.8	
315	1.64	12.8	100.1	65.5	34.1	
400	1.66	22.1	99.6	64.8	34.4	
500	1.64	9.0	99.0	61.4	37.0	
630	1.58	10.6	98.4	61.3	36.4	
800	1.50	9.6	97.5	61.2	35.4	
1,000	1.50	16.2	96.3	58.8	36.7	
1,250	1.49	13.0	98.2	57.0	40.3	
1,600	1.49	5.6	99.0	60.4	37.7	
2,000	1.52	6.1	97.5	55.3	41.3	
2,500	1.51	6.8	97.8	53.2	43.7	
3,150	1.50	8.1	98.0	51.9	45.3	
4,000	1.40	9.2	98.7	48.4	49.1	
5,000	1.26	8.6	95.7	44.2	49.9	

x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr})$ = 39 (0;-1) dB $C_{50\text{-}3150}$ = 0 dB $C_{50\text{-}5000}$ = 0 dB $C_{100\text{-}5000}$ = 0 dB

$C_{tr,50\text{-}3150}$ = -2 dB $C_{tr,50\text{-}5000}$ = -2 dB $C_{tr,100\text{-}5000}$ = -1 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 ±1 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 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:** L107-150 **Test element:** Ventilator

Filler wall area: 9.8 m²

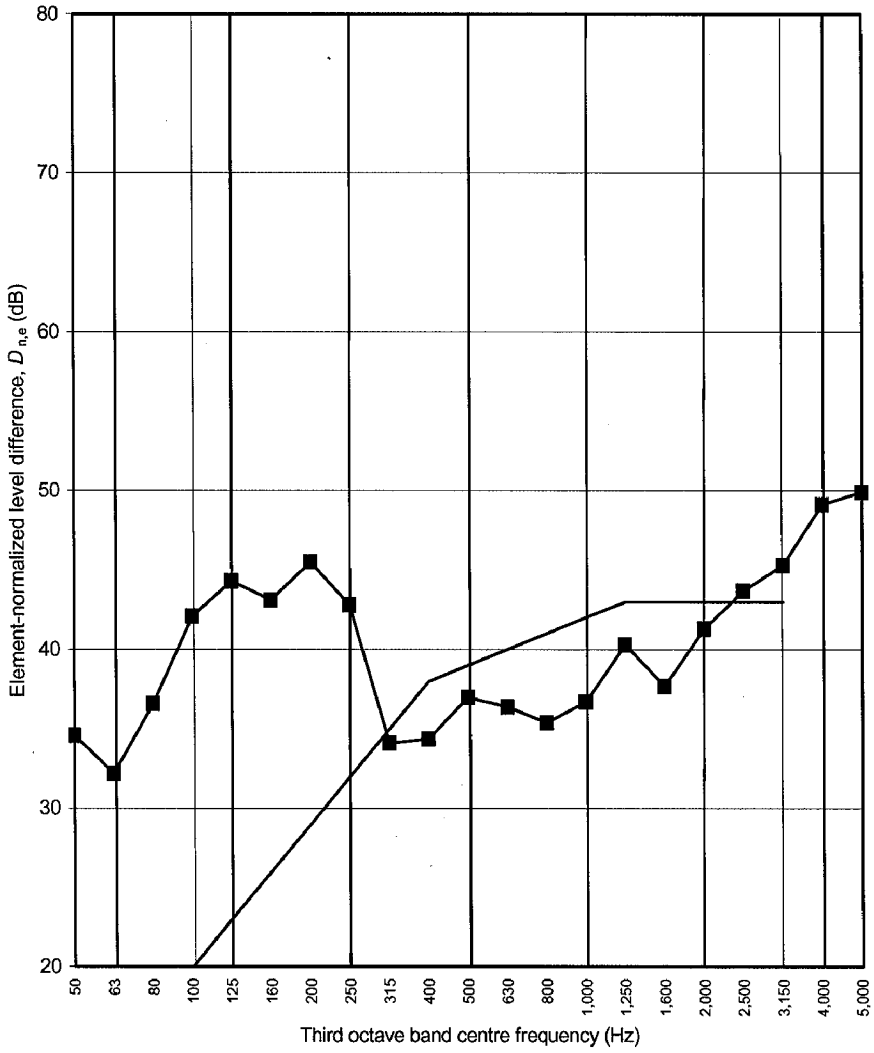
Description:

TAL4H&M ventilator assembly;
x1 MFAB, TAL4000 AirLiner, HM43F Internal (CLOSED)

Source room volume: 130 m³
Receive room volume: 115 m³

Air temperature: 19 °C
Air relative humidity: 71 %

Frequency (Hz)	$D_{n,e}$ One-third octave (dB)	
50	34.6	o
63	32.2	o
80	36.6	o
100	42.1	o
125	44.3	o
160	43.1	x
200	45.5	
250	42.8	
315	34.1	
400	34.4	
500	37.0	
630	36.4	
800	35.4	
1,000	36.7	
1,250	40.3	
1,600	37.7	
2,000	41.3	
2,500	43.7	
3,150	45.3	
4,000	49.1	
5,000	49.9	



x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr})$ = 39 (0;-1) dB

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

bre

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

Prepared for: Karen Jolley

Rytons Building Products Ltd

20 August 2007

Test report number 238655

0578

building a better world

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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:** L107-155 **Test element:** Ventilator

Filler wall area: 9.8 m²
Description:
TALH&M ventilator assembly;
x1 MFAB96, TAL8000 AirLiner, HM85F Internal (OPEN)

Source room volume: 130 m³ **Air temperature:** 19 °C
Receive room volume: 115 m³ **Air relative humidity:** 74 %

Frequency (Hz)	Reverberation time (s)	Background level (dB)	Source level (dB)	Receive level (dB)	$D_{n,e}$ (dB)	
50	3.14	26.4	92.3	59.4	36.6	o
63	2.21	20.6	100.1	68.1	34.1	o
80	1.83	15.3	99.7	64.6	36.4	o
100	1.67	13.4	100.5	61.3	40.1	o
125	2.03	12.2	103.1	67.0	37.1	x
160	1.87	19.4	102.2	64.6	37.6	
200	1.87	34.8	102.2	63.4	38.9	
250	1.72	13.7	100.1	65.4	34.4	
315	1.68	12.8	100.2	69.4	30.3	
400	1.61	23.9	99.7	68.3	30.8	
500	1.66	9.9	99.0	66.8	31.7	
630	1.60	10.3	98.6	60.4	37.6	
800	1.47	9.8	97.7	57.4	39.3	
1,000	1.45	15.6	96.5	56.0	39.5	
1,250	1.51	12.4	98.3	54.0	43.4	
1,600	1.48	6.2	98.9	54.9	43.1	
2,000	1.52	6.4	97.5	49.1	47.6	
2,500	1.50	7.0	97.8	44.8	52.1	
3,150	1.45	7.6	97.8	42.6	54.2	
4,000	1.38	8.0	98.5	43.8	53.4	
5,000	1.26	9.8	95.6	39.8	54.2	

x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr})$ = 39 (0;-2) dB $C_{50\text{-}3150}$ = 0 dB $C_{50\text{-}5000}$ = 1 dB $C_{100\text{-}5000}$ = 1 dB

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

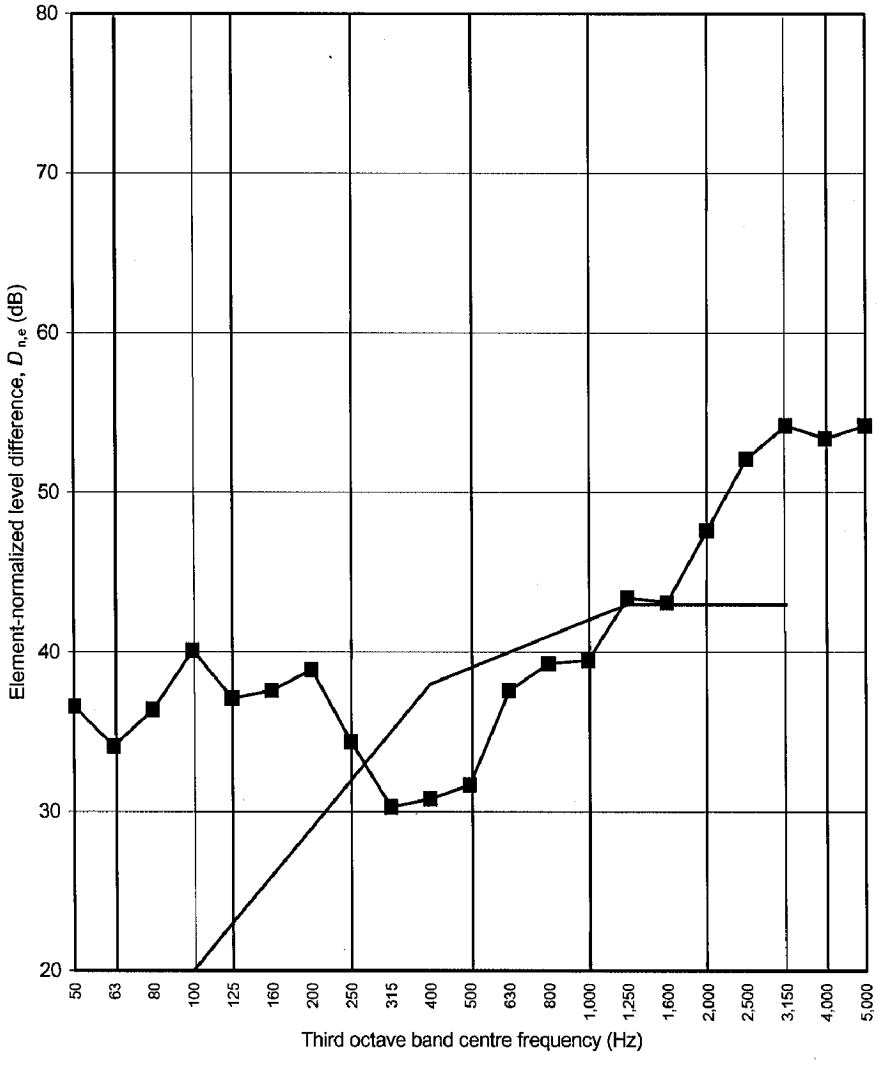
0578

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:** L107-155 **Test element:** Ventilator

Filler wall area: 9.8 m²
Description:
TALH&M ventilator assembly;
x1 MFAB96, TAL8000 AirLiner, HM85F Internal (OPEN)

Source room volume: 130 m³ **Air temperature:** 19 °C
Receive room volume: 115 m³ **Air relative humidity:** 74 %

Frequency (Hz)	$D_{n,e}$ One-third octave (dB)	
50	36.6	o
63	34.1	o
80	36.4	o
100	40.1	o
125	37.1	x
160	37.6	
200	38.9	
250	34.4	
315	30.3	
400	30.8	
500	31.7	
630	37.6	
800	39.3	
1,000	39.5	
1,250	43.4	
1,600	43.1	
2,000	47.6	
2,500	52.1	
3,150	54.2	
4,000	53.4	
5,000	54.2	



x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr})$ **= 39 (0;-2) dB**

$C_{50\text{-}3150}$	= 0 dB	$C_{50\text{-}5000}$	= 1 dB	$C_{100\text{-}5000}$	= 1 dB
$C_{tr,50\text{-}3150}$	= -2 dB	$C_{tr,50\text{-}5000}$	= -2 dB	$C_{tr,100\text{-}5000}$	= -2 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 ±1 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 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:** L107-156 **Test element:** Ventilator

Filler wall area: 9.8 m²
Description:
TALH&M ventilator assembly;
x1 MFAB96, TAL8000 AirLiner, HM85F Internal (CLOSED)

Source room volume: 130 m³
Receive room volume: 115 m³
Air temperature: 19 °C
Air relative humidity: 74 %

Frequency (Hz)	Reverberation time (s)	Background level (dB)	Source level (dB)	Receive level (dB)	$D_{n,e}$ (dB)	
50	3.14	22.3	91.7	58.9	36.4	o
63	2.21	15.5	100.0	67.8	34.3	o
80	1.83	13.3	99.7	63.5	37.4	o
100	1.67	13.7	100.1	60.7	40.3	o
125	2.03	10.7	103.0	66.8	37.3	x
160	1.87	20.1	102.3	64.4	38.0	
200	1.87	35.3	102.4	63.3	39.2	
250	1.72	13.7	100.0	65.2	34.6	
315	1.68	12.6	100.1	69.1	30.5	
400	1.61	22.1	99.7	68.1	31.0	
500	1.66	9.3	99.0	66.4	32.1	
630	1.60	9.3	98.6	59.8	38.2	
800	1.47	10.5	97.6	56.9	39.7	
1,000	1.45	16.1	96.4	55.7	39.6	
1,250	1.51	11.6	98.2	54.2	43.1	
1,600	1.48	5.8	98.9	54.9	43.1	
2,000	1.52	6.1	97.4	48.8	47.8	
2,500	1.50	6.7	97.8	43.7	53.2	
3,150	1.45	7.8	97.9	41.4	55.5	
4,000	1.38	8.4	98.6	40.9	56.5	
5,000	1.26	8.7	95.7	36.3	57.8	

x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr})$ = 40 (-1;-3) dB

$C_{50\text{-}3150}$	= -1 dB	$C_{50\text{-}5000}$	= 0 dB	$C_{100\text{-}5000}$	= 0 dB
$C_{tr,50\text{-}3150}$	= -3 dB	$C_{tr,50\text{-}5000}$	= -3 dB	$C_{tr,100\text{-}5000}$	= -3 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 ±1 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 measurement of airborne sound insulation of small building elements
Element-normalized level difference according to BS EN 20140-10:1992
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Source room volume: 130 m³
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Air temperature: 19 °C
Air relative humidity: 74 %

Frequency (Hz)	$D_{n,e}$ One-third octave (dB)	
50	36.4	o
63	34.3	o
80	37.4	o
100	40.3	o
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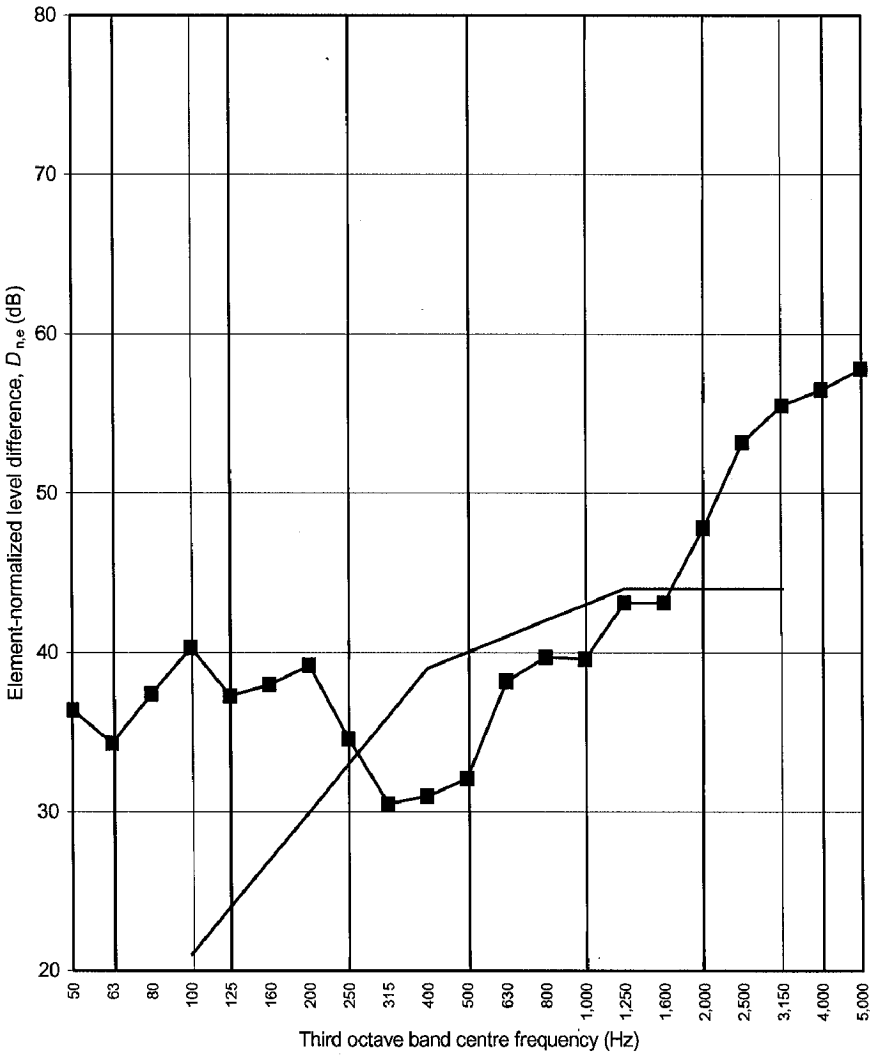
200	39.2	
250	34.6	
315	30.5	
400	31.0	
500	32.1	
630	38.2	
800	39.7	
1,000	39.6	
1,250	43.1	
1,600	43.1	
2,000	47.8	
2,500	53.2	
3,150	55.5	
4,000	56.5	
5,000	57.8	



x Adjusted for flanking transmission

o Correction = 1.3 dB

Rating according to BS EN ISO 717-1:1997

$D_{n,e,w}(C;C_{tr})$ **= 40 (-1;-3) dB**

$C_{50\text{-}3150}$	= -1 dB	$C_{50\text{-}5000}$	= 0 dB	$C_{100\text{-}5000}$	= 0 dB
$C_{tr,50\text{-}3150}$	= -3 dB	$C_{tr,50\text{-}5000}$	= -3 dB	$C_{tr,100\text{-}5000}$	= -3 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 ±1 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 ($D_{n,e,w}$)

bre

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

Prepared for: Karen Jolley

Rytons Building Products Ltd

20 August 2007

Test report number 238655

0578

building a better world

CI/SfB reference by RIBA SfB Agency

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Wall			

September 2020

RYTONS

THE HOME OF VENTILATION

A Family Business

Since 1972

Rytons Background Room Ventilators

Interactive guide with links to technical information

Contents

What is a $D_{n,e,w}$ sound reduction figure?

A $D_{n,e,w}$ figure reflects testing at every frequency and it is the only result recommended by the BRE for products such as vents. As there is no industry standard for presenting acoustic test results, beware of any manufacturer who quotes an unspecified dB figure. An unspecified figure may simply be the highest dB achieved at an individual frequency and may not bear any relation to your circumstances or to the type of noise you are aiming to reduce. Only a $D_{n,e,w}$ figure gives you peace of mind that the result reflects the true performance of the product.

Extracts from The Building Regulations Approved Document F, Means of ventilation, 2010

Approved Document F is a complex document with many criteria for working out the background ventilation requirements of a dwelling. The following extracts are a brief introduction as to why ventilation is required and to which ventilation systems Rytons products are best suited. A free download of Approved Document F is available at http://www.planningportal.gov.uk/buildingregulations/approveddocuments/partf

Section 4: Introduction to the provisions

The purpose of ventilation

4.6 Ventilation is simply the removal of 'stale' indoor air from a building and its replacement with 'fresh' outside air. It is assumed within the Approved Document that the outside air is of reasonable quality.

4.7 Ventilation is required for one or more of the following purposes:

a) provision of outside air for breathing;
b) dilution and removal of airborne pollutants, including odours;
c) control of excess humidity (arising from water vapour in the indoor air);
d) provision of air for fuel-burning appliances (which is covered under Part J of the Building Regulations).

Control of ventilation

4.18 It is important that ventilation is controllable so that it can maintain reasonable indoor air quality and avoid waste of energy. These controls can be either manual (i.e. operated by the occupant) or automatic.

4.19 Manually controlled trickle ventilators (the most common type of background ventilators) can be located over the window frames, in window frames, just above the glass or directly through the wall. They are positioned typically 1.7m above floor level to avoid discomfort due to cold draughts.

Equivalent areas of ventilators

4.26 Equivalent area is used in the Approved Document instead of free area for the sizing of background ventilators (including trickle ventilators) because it is a better measurement of the air flow performance of the ventilator. BS EN 13141-1:2004 (Clause 4) includes a method of measuring the equivalent area of background ventilation openings.

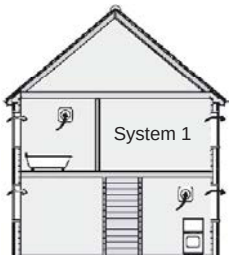
All Rytons background ventilator sets (including acoustic) have equivalent area measurements calculated by the BRE at 1Pa to BS EN 13141-1:2004.

Section 5: New Dwellings

Ventilation systems for new dwellings without basements

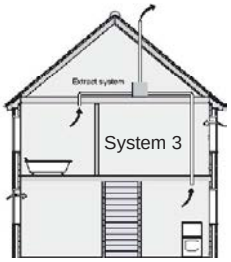
Select one of the four ventilation systems. Rytons background ventilators are most suited to System 1 and System 3.

System 1: Background ventilators and intermittent extract fans



Guidance on minimum provisions for extract and whole dwelling ventilation is set out in Table 5.2a. Note that it includes separate guidance for dwellings with habitable rooms having only a single exposed façade. Rytons is able to supply the non-mechanical aspects to achieve System 1.

System 3: Continuous mechanical extract (MEV)



Guidance on minimum provisions for extract and whole dwelling ventilation is set out in Table 5.2c. Rytons is able to supply the non-mechanical aspects to achieve System 3.

Refer to Approved Document F for details of System 2: Passive stack ventilation (PSV) and System 4: Continuous mechanical supply and extract with heat recovery (MVHR).

Equivalent Area Calculations

Calculating background ventilation requirements for houses can be a daunting task. If you would like us to help you with your calculations simply email admin@rytons.com with the following information:-

1. Total floor area in m² (all floor areas combined).
2. Dwelling Type:
   a) Single-storey dwelling located up to and including the fourth storey above ground level.
   b) Multi-storey dwelling or a single-storey dwelling that is located more than four storeys above ground level.
3. Number of bedrooms.
4. Number of façades.
5. Design air permeability.
6. Acoustic requirements.

Make quick and easy ventilation calculations anytime with our free online calculators at **www.vents.co.uk**.

Rytons Controllable Unsilenced LookRyt® AirCore® Range

AC10HP - Rytons Controllable LookRyt AirCore

- 5" core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- 7,500mm² (75cm²) equivalent area.
- Terracotta, buff/sand, white.

AC10HPCWL - Rytons Cowled Controllable LookRyt AirCore

- Cowled 5" core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- 7,300mm² (73cm²) equivalent area.
- Terracotta, buff/sand, white.

AC7HP - Rytons Baffled Controllable LookRyt AirCore

- Baffled 5" core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- 6,500mm² (65cm²) equivalent area.
- Terracotta, buff/sand, white.

AC7HPCWL - Rytons Cowled Baffled Controllable LookRyt AirCore

- Cowled and baffled 5" core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- 6,700mm² (67cm²) equivalent area.
- Terracotta, buff/sand, white.

ACH75HP - Rytons Internal Fit Controllable LookRyt AirCore

Fitted from the inside

- Baffled 5" core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- 6,700mm² (67cm²) equivalent area.
- Terracotta, buff/sand, white.

Rytons Controllable Super Acoustic LookRyt® AirCore® Range

AAC125HP - Rytons Super Acoustic Controllable LookRyt AirCore

Acoustic

- Acoustic core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- Reduces sound by 43 dB (Dn,e,w) open and 50 dB (Dn,e,w) closed.
- 8,500mm² (85cm²) equivalent area.
- Terracotta, buff/sand, white.

AAC125HPCWL - Rytons Cowled Super Acoustic Controllable LookRyt AirCore

Acoustic

- Cowled acoustic core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- Reduces sound by 45 dB (Dn,e,w) open and 50 dB (Dn,e,w) closed.
- 8,400mm² (84cm²) equivalent area.
- Terracotta, buff/sand, white.

AAH125HP - Rytons Internal Fit Super Acoustic Controllable LookRyt AirCore

Fitted from the inside

Acoustic

- Acoustic core vent for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Draught reducing LookRyt panel easily adjusted with a push/pull or tilt action and may be painted or wallpapered for a discreet appearance.
- Reduces sound by 44 dB (Dn,e,w) open and 50 dB (Dn,e,w) closed.
- 7,700mm² (77cm²) equivalent area.
- Terracotta, buff/sand, white.

Make quick and easy ventilation calculations anytime with our free online calculators at **www.vents.co.uk**.

Tailor-made by Rytons

Bespoke ventilation service

- Plastic ventilators in custom colours (including RAL and NCS).
- Metal ventilators powder coated in a range of colours and finishes.
- Metal air bricks and adaptors in a range of finishes including Class 0 Flame Retardant paint.
- Specialists in bespoke ventilation for high-rise buildings over 18m high.
- Complete service from design and tooling to manufacture and supply.

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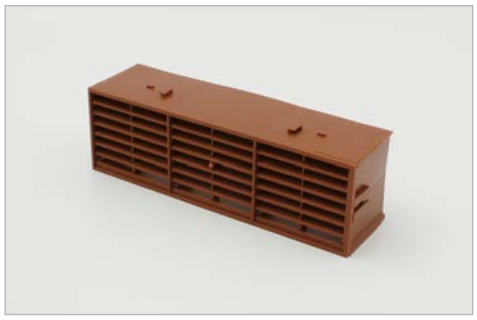
See our tailor-made image gallery
at **www.vents.co.uk**.

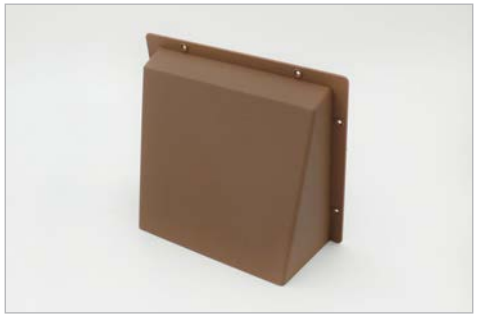













Rytons Controllable Ventilation Sets '9x3'

TC8H&M - Rytons 9x3 Ventilation Set with Hit & Miss Ventilator

- Ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-368mm L including air brick.
- 10,200mm² (102cm²) equivalent area.
- Terracotta, buff/sand, white, grey, blue/black, black, brown.

TC8HMCWL - Rytons 9x3 Cowled Ventilation Set with Hit & Miss Ventilator

- Cowled and baffled venting set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-368mm L including air brick.
- 10,000mm² (100cm²) equivalent area.
- Terracotta, buff/sand.

Make quick and easy ventilation calculations anytime with our free online calculators at **www.vents.co.uk**.

"Consider an acoustic option ...

One in three individuals is annoyed during the daytime and one in five has disturbed sleep at night because of traffic noise."

World Health Organization

TAL4H&M - Rytons 9x3 Acoustic AirLiner® Set with Hit & Miss Ventilator

Acoustic

- Acoustic ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-368mm L including air brick.
- Reduces sound by 38 dB (Dn,e,w) open and 39 dB (Dn,e,w) closed.
- 6,300mm² (63cm²) equivalent area.
- Terracotta, buff/sand, white, grey, blue/black, black, brown.

TAL4HMCWL - Rytons 9x3 Cowled Acoustic AirLiner® Set with Hit & Miss Ventilator

Acoustic

- Cowled acoustic ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-368mm L including air brick.
- Reduces sound by 39 dB (Dn,e,w) open and 40 dB (Dn,e,w) closed.
- 6,300mm² (63cm²) equivalent area.
- Terracotta, buff/sand.

Rytons Controllable Ventilation Sets '9x6'

TC18HM - Rytons 9x6 Ventilation Set with Hit & Miss Ventilator


- Ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- 19,800mm² (198cm²) equivalent area.
- Terracotta, buff/sand, white, grey, blue/black, black, brown.

TC18HCWL - Rytons 9x6 Cowled Ventilation Set with Hit & Miss Ventilator


- Cowled and baffled venting set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- 18,000mm² (180cm²) equivalent area.
- Terracotta, buff/sand, white.

Make quick and easy ventilation calculations anytime with our free online calculators at **www.vents.co.uk**.

"Consider an acoustic option ...

Both road traffic noise and aircraft noise increase the risk of high blood pressure."

World Health Organization

TALH&M - Rytons 9x6 Acoustic AirLiner® Set with Hit & Miss Ventilator


Acoustic

- Acoustic ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- Reduces sound by 39 dB (Dn,e,w) open and 40 dB (Dn,e,w) closed.
- 10,500mm² (105cm²) equivalent area.
- Terracotta, buff/sand, white, grey, blue/black, black, brown.

TALHMCWL - Rytons 9x6 Cowled Acoustic AirLiner® Set with Hit & Miss Ventilator


Acoustic

- Cowled acoustic ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- Reduces sound by 42 dB (Dn,e,w) open or closed.
- 9,800mm² (98cm²) equivalent area.
- Terracotta, buff/sand, white.

Rytons Controllable Ventilation Sets '9x9'

TC20HM - Rytons 9x9 Ventilation Set with Hit & Miss Ventilator

- Ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- 30,000mm² (300cm²) equivalent area.
- Terracotta, buff/sand, white, grey, blue/black, black, brown.

TC20HCWL - Rytons 9x9 Cowled Ventilation Set with Hit & Miss Ventilator

- Cowled and baffled venting set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- 27,000mm² (270cm²) equivalent area.
- Terracotta, buff/sand, white.

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Consider an acoustic option ...

"Road traffic noise has been shown to increase the risk of ischaemic heart disease."

World Health Organization

TAL9H&M - Rytons 9x9 Acoustic AirLiner® Set with Hit & Miss Ventilator

Acoustic

- Acoustic ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- Reduces sound by 38 dB (Dn,e,w) open or closed.
- 12,800mm² (128cm²) equivalent area.
- Terracotta, buff/sand, white, grey, blue/black, black, brown.

TAL9HMCWL - Rytons 9x9 Cowled Acoustic AirLiner® Set with Hit & Miss Ventilator

Acoustic

- Cowled acoustic ventilation set for the provision of background air into habitable rooms to disperse moisture, odours and other air pollutants.
- Internal hit & miss grille easily adjusted for controllable ventilation.
- Telescopic liner extends from 250mm-404mm L including air brick.
- Reduces sound by 40 dB (Dn,e,w) open and 41 dB (Dn,e,w) closed.
- 12,700mm² (127cm²) equivalent area.
- Terracotta, buff/sand, white.

Rytons Window Trickle Ventilators

R1700 - Rytons Window Trickle Ventilator (265mm L)

- Window frame ventilator for the provision of air into habitable rooms/wet rooms.
- Quickly and easily fitted over milled out slots in the window frame.
- Adjustable internal vent allows controllable ventilation.
- 1,700mm² (17cm²) equivalent area.
- 265mm L x 18.5mm H x 20-26mm D (overall internal).
- White, brown.

R2700 - Rytons Window Trickle Ventilator (412mm L)

- Window frame ventilator for the provision of air into habitable rooms/wet rooms.
- Quickly and easily fitted over milled out slots in the window frame.
- Adjustable internal vent allows controllable ventilation.
- 2,700mm² (27cm²) equivalent area.
- 411mm L x 18.5mm H x 20-26mm D (overall internal).
- White, brown.

R5000 - Rytons Window Trickle Ventilator (497mm L)

- Window frame ventilator for the provision of air into habitable rooms/wet rooms.
- Quickly and easily fitted over milled out slots in the window frame.
- Adjustable internal vent allows controllable ventilation.
- 5,000mm² (50cm²) equivalent area.
- 497mm L x 30mm H x 20-27mm D (overall internal).
- White, brown.

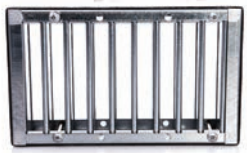
Make quick and easy ventilation calculations anytime with our free online calculators at **www.vents.co.uk**.

Rytons Intumescent RytBlocks

TL8FIRE - Rytons 9x3 Intumescent RytBlock

- Heavy duty intumescent grille for Rytons 9x3 AirLiner sets, walls, ducts and doors.
- Gives 3 hours protection preventing the passage of smoke and gases.
- In the event of a fire slats fuse together and seal within 2 minutes.
- Temperature increase insulated for 22 minutes.
- 5,330mm² (53.3cm²) free area.
- 206mm L x 58mm H x 44mm D.

TL18FIRE - Rytons 9x6 Intumescent RytBlock



- Heavy duty intumescent grille for Rytons 9x6 AirLiner sets, walls, ducts and doors.
- Gives 3 hours protection preventing the passage of smoke and gases.
- In the event of a fire slats fuse together and seal within 2 minutes.
- Temperature increase insulated for 22 minutes.
- 13,390mm² (133.9cm²) free area.
- 206mm L x 124mm H x 44mm D.

TL20FIRE - Rytons 9x9 Intumescent RytBlock

- Heavy duty intumescent grille for Rytons 9x9 AirLiner sets, walls, ducts and doors.
- Gives 3 hours protection preventing the passage of smoke and gases.
- In the event of a fire slats fuse together and seal within 2 minutes.
- Temperature increase insulated for 22 minutes.
- 22,520mm² (225.2cm²) free area.
- 192mm L x 207mm H x 43mm D.

ACFIRE125 - Rytons 125mm AirCore® Intumescent RytBlock

- Heavy duty intumescent grille for Rytons 125mm AirCore sets, walls and ducts.
- Gives 3 hours protection preventing the passage of smoke and gases.
- In the event of a fire slats fuse together and seal within 2 minutes.
- Temperature increase insulated for 22 minutes.
- 5,150mm² (51.5cm²) free area.
- 118mm Dia. x 43cm D.

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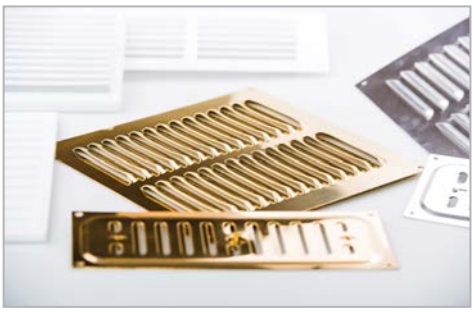

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