

BS8233 NOISE ASSESSMENT AND PLANNING REPORT

6 Malthouse Lane, Reading, RG1 7JA

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V2 8/11/22

Noise Assessment Report- Harmeet Bal BSc

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1 Introduction

Clearstream have been appointed to undertake an acoustic assessment to support the discharge of planning condition related to the details below.

Whilst the planning condition specifically references BS8233:2014, the British Standard document does not cover the indices of LA_{max}, which at night time could well cause awakenings in a bedroom environment. More recently published and specific planning guidance (Pro-PG (2017)) has been used to ensure that the future residents have protection from aviation noise which dominates the site soundscape.

2 Context, Noise Criteria & Noise Assessment Methodology

2.1 Context

The consented application allows for the conversion of an existing commercial building to a residential dwelling at 6 Malthouse Lane, Reading, RG1 7JA

The new dwelling is set on a road near to Reading town centre which is just to the East of the site.

2.2 National Planning Policy Framework 2012

The National Planning Policy Framework (March 2012) defines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people, and their answerable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Paragraph 123 within NPPF Section 11 (Conserving and enhancing the natural environment) states the following:

Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

2.3 Noise Policy Statement for England (NPSE)

2.3.1 NPSE Mission Statement

The document "Noise Policy Statement for England" sets out the following vision for on-going noise policy:

"Promote good health and quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through the following Noise Policy Aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development: avoid significant adverse impacts on health and quality of life; mitigate and minimise adverse impacts on health and quality of life; and where possible, contribute to the improvement of health and quality of life".

2.3.2 NPSE Noise “Effect Levels” To achieve these objectives the Noise Policy Statement sets out three noise levels to be defined by the assessor:

- NOEL - No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level there is no detectable effect on health and quality of life due to the noise.

- LOAEL - Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

- SOAEL - Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable.

Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:

"all reasonable steps should be taken to mitigate and minimize adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.... This does not mean that such adverse effects cannot occur."

Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change.

2.3.3 Guidance Documents

For guidance as to a numerical definition of LOAEL, while this is not provided specifically, it is helpful to refer to the following Standards.

- BS8233: 2014: Guidance on Sound insulation and noise reduction for buildings
- World Health Organization (WHO) - Guidelines for Community Noise 1999
- BS4142: 2014: Method for rating and assessing industrial and commercial sound

2.4 WHO Internal Noise Criteria

The target internal levels are based on guidelines laid out by the World Health Organisation (WHO) and are as follows:

Room Type	Target Maximum Internal Level - Leq dB (A)
Living Rooms	35 (Daytime only)
Bedrooms	30 (Night)

The target maximum internal noise level for a bedroom during the night time corresponds to the threshold of sleep disturbance. WHO state that the noise level outside a bedroom window would be less than 45dB(A) this assumes that an open window provides 15dB attenuation.

2.5 Professional Practice Guidance on Planning and Noise (Pro-PG, 2017)

Professional Practice Guidance on Planning and Noise (Pro-PG): Planning and Noise was published in May 2017 and is specifically concerned with airborne transportation noise and how this might impact new residential developments. A table is summarised below in Figure

2. The night time noise levels have been determined both over an 8-hour period and usefully an analysis of each hour periods to ensure a thorough approach. It should however be noted that Note 4 of the guidance requires as follows:

“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”

ACTIVITY	LOCATION	07:00 – 23:00 HRS	23:00 – 07:00 HRS
Resting	Living room	35 dB $L_{Aeq,16\text{ hr}}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\text{ hr}}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\text{ hr}}$	30 dB $L_{Aeq,8\text{ hr}}$ 45 dB $L_{Amax,T}$ (Note 4)

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 $L_{Amax,T}$, 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 $L_{Amax,T}$ 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).

Figure 2. ProPG Internal Noise Level Guidelines (additions to BS8233:2014 shown in blue)

Figure 2. Pro-PG (2017)

2.6 WHO External Noise Criteria

With regard to outdoor amenity areas WHO states the following:

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB(A) on balconies, terraces and in outdoor living areas.

To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 50dB(A) on balconies, terraces and in outdoor living areas.

2.7 BS8233 Noise Criteria

Table 4 of BS8233 provides the following guideline values:

Activity	Location	Time period of day	
		07:00-23:00	23:00-07:00
Resting	Living Rooms	35dB $L_{Aeq,16hour}$	
Dining	Dining Room/Area	40dB $L_{Aeq,16hour}$	
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$

3 Background Sound Survey Baseline Conditions & Results

Whilst setting up and dismantling the equipment, some traffic noise formed the dominant part of the soundscape.

To establish the existing environmental noise levels on site, a noise survey was conducted between 10:38pm on the 17/10/2022 and 12:48pm on the 18/10/2022. This site assessment was undertaken by Harmeet Bal of Clearstream Projects.

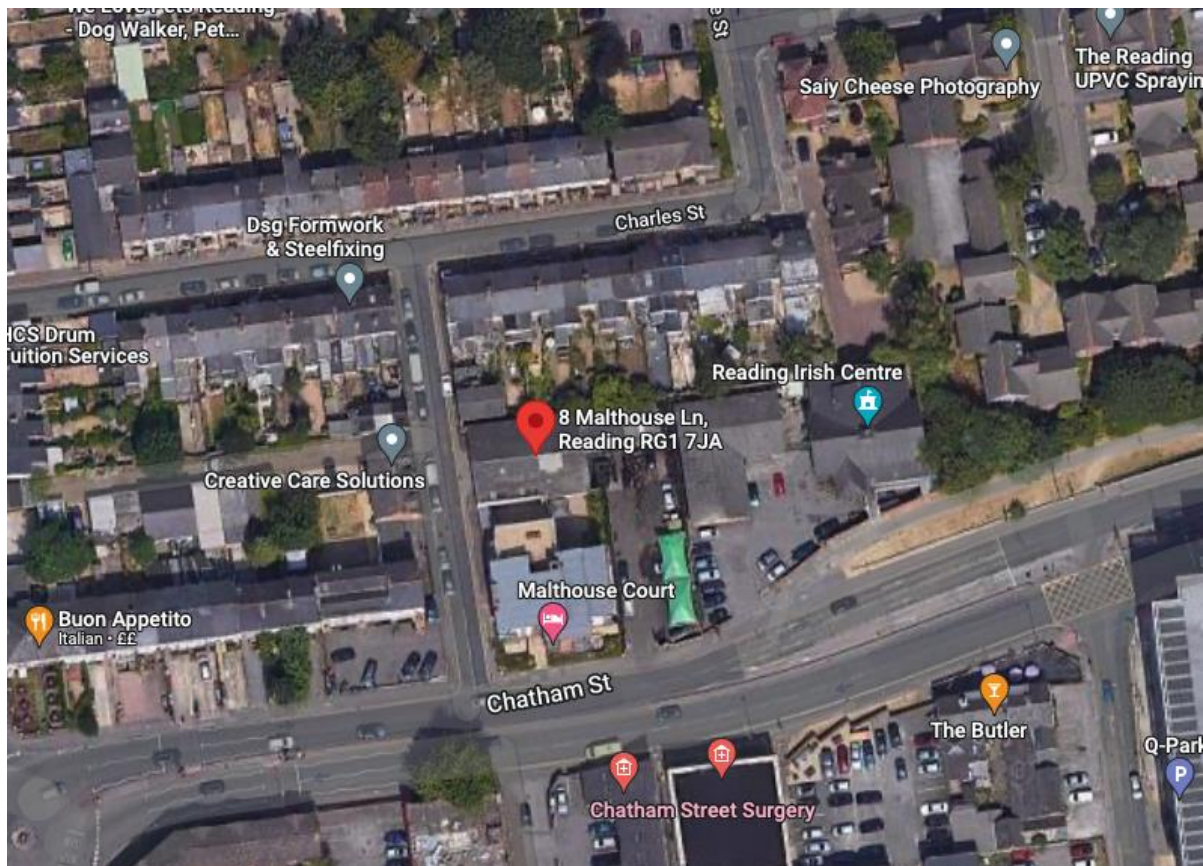
The microphone was located at 1m from the facade outside the building and was protected by an outdoor weatherproof system and the measurement position is shown on Figure 1. Weather conditions throughout were mostly dry and mild.

The meter was calibrated before and after the measurement and no significant drifting of the calibration signal was observed. A copy of the instrument calibration certificates are available.

Measurements were undertaken for a 48 hour period and the following parameters were recorded:

L_{Aeq}	The equivalent continuous noise level over 15 minute periods
L_{Amax}	The maximum noise level during each period
L_{A90}	The level exceeded for 90% of the time, the background level

Figure 3. Location of Survey Equipment



3.1 Background Noise Survey Details

Item	Serial Number	Last Calibration	Certificate Number	Calibration Due
NTi Precision Sound Analyzer XLA TA	A2A-11360-E0	30/07/2022	U35357	30/08/2024
NTi Preamplifier MA220	6003	30/07/2022	U35355	30/08/2024
NTi Microphone MC230	9323	30/07/2022	U35356	30/08/2024
Calibrator- Larson Davis CAL200	12601	30/07/2022	U35355	18/08/2024

The sound level meter was calibrated before and after commencing the noise measurements (@94dB with no drift).

All measurements were taken with the time base set to 5 and 15-minute interval periods. All measurements were taken with the microphones in façade/near field conditions.

3.2 Weather Conditions

The wind speed conditions for environmental monitoring were within the requirements for environmental surveying and below 5m/s-1 . The weather was dry and generally good for the duration of the survey with some cloud cover.

3.3 Noise Survey Results

A summary of the noise survey results showing both the L Aeq,5 minute and L AMax and L Aeq,15 minute readings is seen below in Figures 9 and 10.

	Time Period	Measured LAeq	Open Window	Internal Level	BS8233 Target
Day 16hr	07:00 - 23:00	56.8	-15	41.8	35
Night 8hr	23:00 - 07:00	51.0	-15	36.0	30

Figure 9

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Start: 2022-10-17 10:38:44

End: 2022-10-18 11:48:29

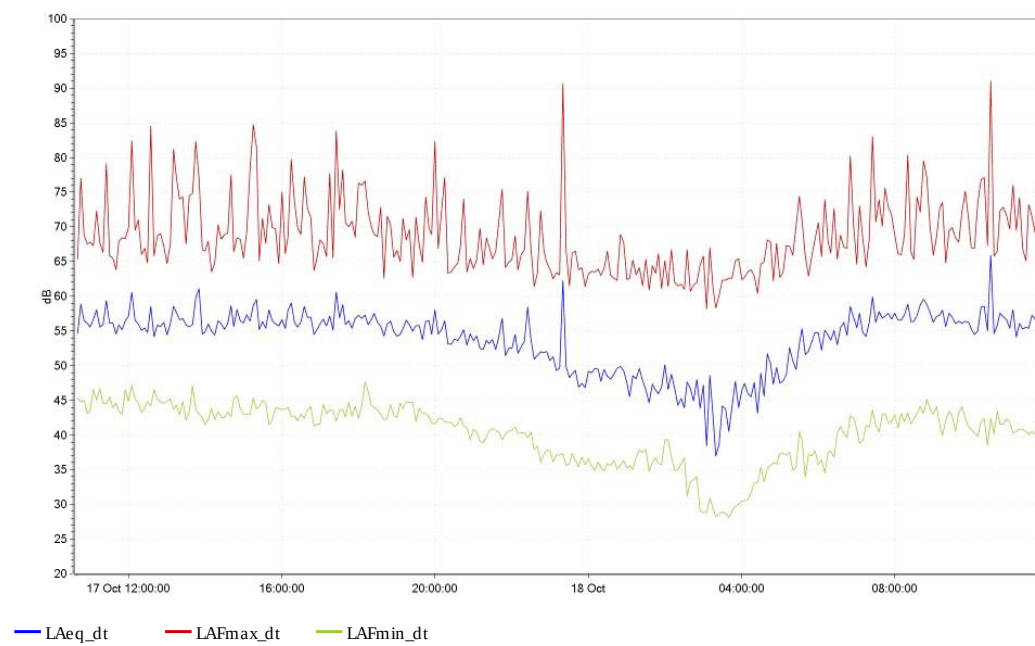


Figure 10

Proposed Mitigation Measures

Mitigation measures need to be in place to minimise the potential negative impacts in order to ensure that the internal noise limits are achieved, we would recommend the following scheme of mitigation measures as outlined below.

4.1 Non-Glazed Elements

It is currently understood that the non-glazed building façade elements of the proposed development would be comprised of masonry. To ensure robust mitigation, it is proposed that all external non-glazed elements of the building façade should be able to provide a sound reduction performance of at least 35.0 dB.

4.2 Glazed Elements

It is proposed that any façade/window with an acoustically laminated double-glazed window should be able to attenuate background noise by 35.0 dB(A).

The nominated glazing supplier should verify that their proposed window system meets the attenuation required.

4.3 Amenity Areas

Based on the findings in section 5.1 of this report, the prevailing daytime noise levels of 56.8 dB will exceed BS8233 guidance of 55 dB at the location of the amenity areas.

‘it is 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.’

BS8233:2014 Section 7.7.3.2

4.4 Ventilation Strategy

4.4.1 Passive

Should natural ventilation be provided, we would recommend the use of acoustic trickle vents with the following attenuation characteristics ≥ 35.0 dB, D n,e,w. (see Appendix C for example). It is also to be noted that should windows be used, BS 8233 states that “If partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB, resulting in the target levels being exceeded. However, windows may still be openable for rapid or purge ventilation, or occupant’s choice.” This would also vary on the type of window used.

Conclusion

Environmental noise levels have been measured at the application site between 17th October 2022 and 18th October 2022. An environmental noise survey has been undertaken for the proposed development following the assessment of daytime and night-time levels likely to be experienced by the proposed development.

Whilst the planning condition specifically references BS8233:2014, the British Standard document does not cover the indices of LA_{max}, which at night time could well cause awakenings in a bedroom environment. More recently published and specific planning guidance (Pro-PG (2017)) has been used to ensure that the future residents have protection from aviation noise which dominates the site soundscape.

The results shown in 3.3 Noise Survey Results indicate that no special measures are required to adhere to WHO noise level recommendations. A solution comprising acoustic glass for the development would be sufficient alongside acoustically dampened trickle should be required in order to protect the proposed habitable spaces from external noise intrusion.

Predicted noise levels allowed a robust noise insulation proposal to be made to comply with a minimum value for required attenuation, which would, in turn, provide internal noise levels for all residential environments of the development commensurate to the relevant design standard.

It can, therefore, be concluded that the proposed development is not considered to conflict with any national, regional, or local noise planning policy.

Appendices



Pilkington **Optiphon™**
Laminated Glass for noise control



Pilkington **Optiphon™** – acoustic performance data

Glass types	Acoustic performance data [dB]			Total thickness [mm]
	R _w	C	C _{tr}	
Single glazing				
Pilkington Optiphon™ 6,8	36	-1	-4	6.8
Pilkington Optiphon™ 8,8	37	0	-2	8.8
Pilkington Optiphon™ 10,8	38	-1	-3	10.8
Pilkington Optiphon™ 12,8	40	-1	-3	12.8
Pilkington Optiphon™ 16,8	41	-1	-3	16.8
Pilkington Optiphon™ 20,8	42	-1	-3	20.8
Pilkington Optiphon™ 24,8	43	-1	-3	24.8
Double insulating glass units				
4 mm - 16 mm - Pilkington Optiphon™ 6,8	36	-2	-6	26.8
4 mm - 16 mm - Pilkington Optiphon™ 8,8	39	-3	-7	28.8
6 mm - 16 mm - Pilkington Optiphon™ 6,8	40	-2	-6	28.8
6 mm - 16 mm - Pilkington Optiphon™ 8,8	41	-2	-6	30.8
8 mm - 16 mm - Pilkington Optiphon™ 6,8	42	-3	-7	30.8
8 mm - 16 mm - Pilkington Optiphon™ 8,8	42	-3	-8	32.8
8 mm - 16 mm - Pilkington Optiphon™ 10,8	43	-2	-6	34.8
8 mm - 16 mm - Pilkington Optiphon™ 12,8	43	-2	-6	36.8
10 mm - 16 mm - Pilkington Optiphon™ 8,8	44	-2	-6	34.8
10 mm - 18 mm - Pilkington Optiphon™ 8,8	43	-2	-6	36.8
10 mm - 20 mm - Pilkington Optiphon™ 8,8	46	-2	-6	38.8
10 mm - 16 mm - Pilkington Optiphon™ 12,8	44	-1	-5	36.8
Pilkington Optilam™ 9,5 - 20 mm - Pilkington Optiphon™ 8,8	43	-3	-7	38.3
Pilkington Optilam™ 14,8 - 20 mm - Pilkington Optiphon™ 14,8	47	-1	-3	49.6
Pilkington Optiphon™ 8,8 - 16 mm - Pilkington Optiphon™ 12,8	48	-2	-7	37.6
Pilkington Optiphon™ 8,8 - 20 mm - Pilkington Optiphon™ 12,8	49	-2	-7	41.6
Pilkington Optiphon™ 10,8 - 24 mm - Pilkington Optiphon™ 16,8	52	-2	-6	51.6
Pilkington Optiphon™ 12,8 - 16 mm - Pilkington Optiphon™ 14,8	51	-2	-6	43.6
Pilkington Optiphon™ 12,8 - 16 mm - Pilkington Optiphon™ 16,8	51	-1	-6	45.6
Pilkington Optiphon™ 12,8 - 20 mm - Pilkington Optiphon™ 16,8	51	-1	-4	49.6
Triple insulating glass units				
6 mm - 12 mm - 4 mm - 12 mm - Pilkington Optiphon™ 8,8	42	-3	-8	42.8
6 mm - 14 mm - 4 mm - 14 mm - Pilkington Optiphon™ 8,8	43	-2	-7	44.8
6 mm - 16 mm - 4 mm - 16 mm - Pilkington Optiphon™ 8,8	42	-2	-7	50.8
8 mm - 12 mm - 4 mm - 12 mm - Pilkington Optiphon™ 8,8	43	-2	-7	44.8
8 mm - 16 mm - 4 mm - 16 mm - Pilkington Optiphon™ 8,8	45	-3	-7	52.8
8 mm - 12 mm - 6 mm - 12 mm - Pilkington Optiphon™ 10,8	44	-2	-7	48.8
8 mm - 12 mm - 6 mm - 12 mm - Pilkington Optiphon™ 12,8	45	-1	-5	50.8
8 mm - 14 mm - 6 mm - 14 mm - Pilkington Optiphon™ 12,8	46	-2	-6	54.8
10 mm - 14 mm - 6 mm - 14 mm - Pilkington Optiphon™ 12,8	46	-1	-3	56.8
Pilkington Optiphon™ 8,8 - 12 mm - 4 mm - 12 mm - Pilkington Optiphon™ 8,8	46	-2	-7	45.6
Pilkington Optiphon™ 8,8 - 12 mm - 6 mm - 12 mm - Pilkington Optiphon™ 10,8	47	-2	-7	49.6
Pilkington Optiphon™ 8,8 - 12 mm - 6 mm - 12 mm - Pilkington Optiphon™ 12,8	49	-1	-7	51.6
Pilkington Optiphon™ 8,8 - 14 mm - 6 mm - 12 mm - Pilkington Optiphon™ 12,8	49	-1	-6	53.6
Pilkington Optiphon™ 8,8 - 14 mm - 6 mm - 14 mm - Pilkington Optiphon™ 12,8	50	-2	-7	55.6

R_w (C_w/C_p) are determined in accordance with EN 717-1.

Insulating glass units filled with argon (90%).

To calculate other performance data please use Pilkington Spectrum online calculator at <https://spectrum.pilkington.com> or Pilkington Spectrum mobile app.



DN Vent

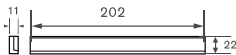
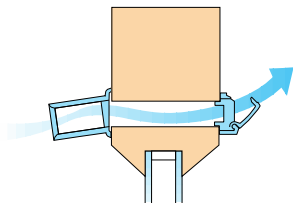
Acoustic window ventilator



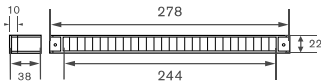
Physical specification

All measurements in millimetres unless otherwise indicated

Materials: ABS



1600DN (external)



2000D (internal)

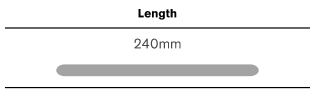
Features and benefits

- Acoustic window vent providing attenuation up to $D_{n,e,w}$ 37dB(A)
- 1400mm² equivalent area
- Internal unit (D Vent) provides upward deflection
- Suitable for installation up to two floors only

Slot size

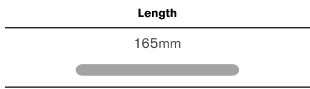
External 1600DN

Height: 15.5mm

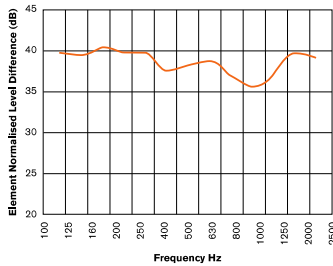


Internal 2000D

Height: 15.5mm



Performance



Acoustic performance

$D_{n,e,w}$: Average weighted performance across frequency range

C: Pink noise

Ctr: Road noise

Models, control options and key data

Product code	Description	Controls	Acoustic performance			Equivalent area mm ²	Colour
			$D_{n,e,w}$	$D_{n,e,w}$ (C)	$D_{n,e,w}$ (Ctr)		
1600DNFW *	Complete unit with D Vent internal	Front	37dB(A)	36dB	34dB	1400	White

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

Project Report

Start: 2022-10-17 10:38:44

End: 2022-10-18 11:48:29

