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Environmental Noise Assessment
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June 2019

Introduction

AB Acoustics were commissioned by Blueprint Architectural Services on behalf of Mr Andy Newcombe of Dickens Vauxhall to undertake an environmental noise assessment for the conversion of former Offices at Unit C Maesgwyn Road Wrexham into residential apartments with associated parking (Reference P/2019/03006)

This assessment was undertaken in order to satisfy the following e mail from the LPA.

From: [Sharon Holman](#)

Sent: Wednesday, May 22, 2019 3:51 PM

To: [Steve Eltham](#)

Subject: P/2019/0306 - Unit C, Maesgwyn Road

Steven,

The development site is in close proximity to a vehicle repair business and railway. The noise levels arising from day/night time activities to allow assessment of the impact upon the residential accommodation have not been provided as part of the submitted scheme. It is not therefore possible to confirm if the proposed scheme of noise insulation and / or attenuation measures have been properly designed to safeguard the amenity of the future occupants of the accommodation.

Please carry out a noise survey to determine these levels (see Technical Advice Note (TAN) 11 – Noise for advice) and submit the results within 14 days of the date of this email.

Kind regards

Sharon Holman

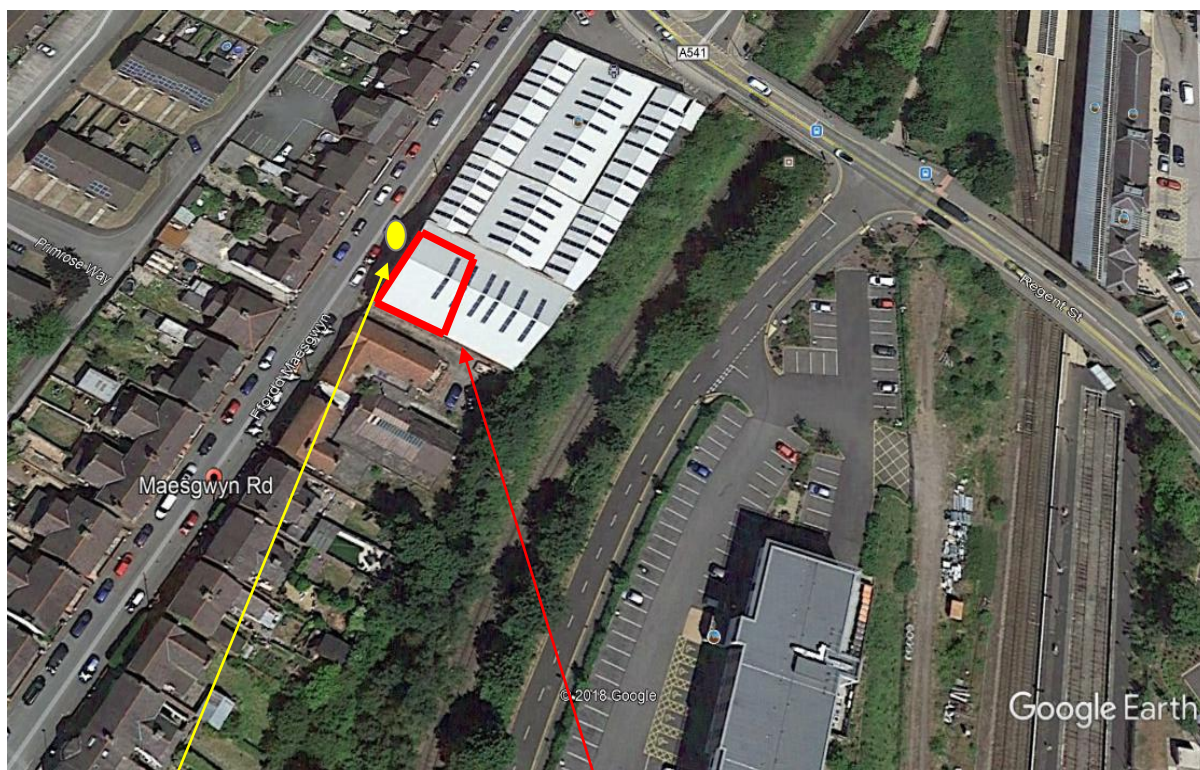
Development Control Planning Officer/ Swyddog Cynllunio Rheoli Datblygu

A plan of the proposed site is shown below, together with the measurement position used to determine the existing noise level in the vicinity. Only one measurement location was used as this was deemed to be representative of the existing noise level at the proposed site.

The report presents the results of the survey to establish the existing noise levels at the site.

As can be seen from the above the site is located in a mixed commercial / residential area.

Immediately adjacent to the proposed three apartments is a car repair facility / tuning Workshop (BD Performance advertised opening hours 09.30 to 17.30 ,though on Tuesday 18 June 2019 the site was opened at around 08.15 hrs.). On the other side of Maesgwyn Road are old established residential properties.



Approximate Measurement Location.

Proposed Site

Noise Assessment Criteria

This is covered by TAN 11 in which the following is detailed :

TABLE 1: NOISE EXPOSURE CATEGORIES	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

The recommended level are detailed below :

Table 2: RECOMMENDED NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS NEAR EXISTING NOISE SOURCES				
Noise Levels⁽¹⁾ corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}dB$				
Noise Source	Noise Exposure Category			
	A	B	C	D

Mixed Sources

07.00 – 23.00	<55	55 – 63	63 – 72	>72
23.00 – 07.00	<45	45 – 57	57 – 66	>66

Noise Assessment Criteria

The likelihood of complaints about noise from industrial plant can be assessed where the standard is appropriate using BS 4142 – 2014 – this has recently replaced the earlier standard BS 4142 : 1997

This standard describes methods for rating and assessing sound of an industrial / commercial nature. The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside / outside residential premises.

The significance of sound of an industrial / commercial nature depends upon the margin by which the rating level of the source exceeds the background sound level and the context in which the sound occurs.

The Standard is intended to be used for :

Investigating complaints regarding noise.

Assessing sound from proposed / new / modified or additional noise sources of an industrial / commercial nature.

Assessing sound at proposed new dwellings or premises used for residential purposes.

The sound level from a source when determined as a discrete entity distinct and free of other influences contributing to the ambient sound is referred to as the 'specific sound level'.

The specific sound level is evaluated at an identified location over the appropriate reference time interval which are : 1 hours during the daytime – 07.00 to 23.00 hrs and 15 minutes during the night time – 23.00 to 07.00 hrs.

The specific noise may be subject to acoustic feature correction if the noise level at the measurement location is subjectively considered to contain certain acoustic features that may increase the significance of the impact of the noise over the background level.

If these features are present at the measurement location then the character correction is added to the specific sound level to arrive at the rating level.

The Standard requires the assessor to consider the subjective prominence of the character of the specific noise source at the measurement location / noise sensitive receptors and the extent to which the character of the noise will attract attention to it – such features are taken into account by applying the following corrections :

	Tonality	Impulsivity	Other Characteristics
Just Perceptible	+ 2 dB	+ 3dB	-
Clearly Perceptible	+ 4dB	+ 6 dB	-
Highly Perceptible	+ 6dB	+9 dB	-
Readily Distinctive against Residual Environment			+ 3 dB

If both tonal and impulsive characteristics are both present then two corrections can be made – however if only one is dominant then only one correction need to be applied.

If no corrections are deemed appropriate then the Rating Level equals the Specific Noise Level.

An initial estimate of the impact of the specific sound is obtained by subtracting the measured background level from the rating level and considering the following :

- A) Typically the greater the difference the greater the impact.
- B) A difference of around + 10 dB or more is likely to be an indication of a significant adverse impact – depending on context.
- C) A difference of around + 5 dB or more is likely to be an indication of a significant adverse impact – depending on context.
- D) The lower the rating level is to the measured background level the less likely it is that the sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the measured background level this is an indication that the sound source will have a low impact depending upon context.

Where the initial estimate of the impact needs to be modified due to the context then all pertinent factors need to be taken into consideration – these include the following :

The absolute level of the sound.

The character and level of the residual sound compared to the character and level of the specific sound.

The sensitivity of the receptor and whether residential dwellings already incorporate design measures that secure good internal and outdoor conditions eg facade insulation – ventilation / cooling that reduces the need to open windows – acoustic screening.

The standard recognises that the response to sound can be subjective as well as to the local attitudes to the source of the sound and the character of the neighbourhood.

In BS 8233: 2014 (Sound Insulation and Noise Reduction in Building, Ref.4) design criteria is provided for noise levels inside buildings : summarised these are :

Bedrooms : $L_{Aeq} = 30$ dBA
Lounge : $L_{Aeq} = 35$ dBA

The above 30 dBA level is acceptable as avoiding sleep disturbance.

The measured external levels are compared to the required internal levels in the Standard to determine the attenuation that must be offered by the structure of the building in order to achieve the required internal levels.

Also it is generally accepted that an open window will achieve an attenuation of 15 dBA to the external noise. However, it has been suggested that this figure is too high and is more likely to be in the region of 10 dBA – as a compromise a figure of 12 dBA has been used for the attenuation of an open window.

The requirements specified in the following report should be regarded as the minimum.

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB L_{Amax} inside the bedroom – this relates to 60 dB L_{Amax} external to the bedroom.

In brief an 'Outdoor Living Area' should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

National Planning Policy Framework

This provides brief guidance on planning and noise – it states that planning policies and the resultant decisions should aim to :

A – 'avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of the development.'

B – 'mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from the new development – this includes the use of conditions'.

C – recognise the development will often create some noise and existing businesses wanting to expand to develop in continuance of their business should not have unreasonable restrictions placed on them because of changes in nearby land uses since they were established.

D – identify and protect areas of tranquility which have remained relatively undisturbed by noise and are prized for their recreational and amenity value.'

Therefore the above internal values from BS 8233 : 2014 are used

BS 4142 : 2014

It is now a requirement of BS 4142 to consider the potential uncertainty of the assessment – the steps taken to reduce uncertainty as far as practical include :

All the measurements were made with a Type 1 sound level meter with certificates of calibration and field calibration checks were undertaken after each series of measurements with a minimal drift (0.1 dB) recorded.

The weather conditions were considered ideal for environmental noise measurements during the attended measurements with no rain – low wind speeds (< 5.0 m /sec).

Variations in ground cover between the proposed site and the receivers could affect the ground absorption and therefore the calculated levels at the various receivers – in order to reduce this problem it has been assumed that there is acoustically reflective ground cover over the various distances.

Inaccuracies that could result from estimates of the intervening ground cover – meteorological conditions etc. will not be significant.

The likelihood of complaints about noise from industrial / commercial premises can be assessed where the standard is appropriate using BS 4142 – 2014.

The above Standard includes in it noise from vehicles that would potentially use the above proposed site.

Within the standard, another Standard, BS8233 is introduced for general guidance on acceptable noise levels within buildings.

Guidance in BS 8233 (Sound Insulation and Noise Reduction in Buildings) provides design criteria for noise inside dwellings. These are:

Bedrooms: LAeq,T = 30 dBA
Living Areas: LAeq,T = 35 dBA

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB LAmax inside the bedroom – this relates to 60 dB LAmax external to the bedroom.

In brief an 'Outdoor Living Area' should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

The Qualitative Guidance NPPG

This new guidance issued in March 2014 is qualitative therefore it does not contain any quantitative guidance on acceptable noise levels.

Paragraph 10 states ' *Care should be taken, however, to avoid these (British Standards) being implemented as fixed thresholds as specific circumstances may justify some variation being allowed* ' .

Therefore it is clear that current guidance assumes that quantitative standards can be used provided that there is flexibility in their application.

In paragraph 5 various noise categories and thresholds are set out; up to and including "Noticeable and Intrusive" it seems likely that the intention would be to recognise that whilst the noise levels are not desirable, planning consent should be granted provided that the noise can be mitigated and the intrusion reduced to a minimum. "Noticeable and Intrusive" noise occurs when:

"Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."

Above the 'Significant Observed Adverse Effect Level ' - SOAEL – threshold, noise becomes 'Noticeable and Disruptive ' because

"The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

Noise which is "Noticeable and disruptive" should be avoided; however, it is the next level of disturbance "Noticeable and very disruptive" that should be prevented.

It can be seen that the NPPG noise guidance envisages that if properties are provided with alternative ventilation and acoustic glazing, designed to ensure "acceptable" internal noise levels, then internal noise levels would not exceed the "Significant Observed Adverse Effect Level" and that planning consent could be

granted. The guidance states “If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout.”

Equipment Used and Measurement Method

The noise levels were measured using a :

Bruel & Kjaer Type 2238 Sound Level Meter (Type 1 instrument)

Calibration was undertaken using a :

Bruel & Kjaer type 4231 calibrator

The measurements were carried out at the location shown .

The measurements were undertaken at the times stated in the results.

The location of the measurements are indicated on the plan above.

Results

Weather

Date	Wind Speed M/sec	Wind Direction	Temperature C	Rain	Cloud Cover %	Road Conditions
10.06.2019 Start	3.1	NE	12	Light	100	Wet
10.06.2019 End	4.3	NE	11	Light	100	Wet
17.06.2019 Start	2.6	SW	16	No	60	Dry
17.06.2019 17.00 hrs	3.2	SW	18	No	100	Dry
17.06.2019 End	2.1	SW	15	No	50	Dry
18.06.2019 Start	-	-	15	No	100	Dry
18.06.2019 End	-	-	17	No	80	Dry

Time	LA eq	LA 90	LA 10	LAmix
10.06.2019 18.45 – 19.45	55.2	47.5	59.5	-
10.06.2019 22.30 – 23.00	54.8	43.2	56.1	-
10.06.2019 23.15 – 23.30	53.6	42.7	55.9	69.3
17.06.2019 10.10 – 11.10	64.8 <i>Jet Wash</i>	50.9		
11.15 – 12.15	55.1	48.5		
13.00 – 14.00	52.7	45.3		
16.00 – 17.00	48.9	43.9		
19.00 – 20.00	51.7	44.2		
22.00 – 23.00	50.4	45.5		
23.00 – 23.15	50.1	45		70.6
23.15 – 23.30	49.8	43.7		71.1
18.06.2019 06.15 – 06.30	45.7	42.1		68.3
06.30 – 06.45	48.9	44.7	-	72.8
08.10 – 09.10	55.9	47.9	-	-
09.40 -10.40	58.4	47.8	-	-

The main noise sources at the proposed site are the traffic flow along Maesgwyn Road, Commercial vehicles (Transit type vans) delivering / collecting to BD Performance and Wrexham Carpets, distant traffic noise from Mold Road (A541).

Internal noise from BD Performance via the open Roller Shutter doors.

At the time of the survey there was no evidence of rail noise as the front facade is effectively screened from the railway by the proposed development itself. Rail noise was not evident at the southern facade either, though the occasional train hooter was.

From the above the Log average noise level between the hours 07.00 and 23.00 is **57 (57.4) dBA** - the Log Average level between the hours 23.00 and 07.00 hrs is **50 (50.3) dBA** with an LA max of **73 dBA**.

The above levels can be considered to be the Specific Noise Level – as Impulsive and Tonal Noise was audible then a correction is added with respect to BS 4142 : 2019 of +2 dB and + 3 dB as both were considered to be 'Just Perceptible'.

This, therefore, results in a Rating Level – between the hours of 07.00 to 23.00 of **62 dBA**. This is used to determine the glazing / ventilation requirements for the apartments between these hours.

Between the hours 23.00 and 07.00 the measured LA eq was **50 dBA** with an LA max of **73 dBA**

Therefore, between 07.00 to 23.00 hrs the attenuation needs to be $62 - 35 = \mathbf{27\ dBA}$ - between 23.00 to 07.00 hrs $50 - 30 = \mathbf{20\ dBA}$ with an attenuation to the LA max of $73 - 45 = \mathbf{28\ dBA}$.

As the noise source is the traffic flow along Maesgwyn Road then as traffic noise contains most of its energy in the lower frequency bands then the $R_w + C_{tr}$ indicator is used rather than the R_w .

All the windows in the apartments can be glazed with 6 / 6 to 20mm / 6mm IGU's which have a quoted $R_w + C_{tr}$ of 27 dB. These units will attenuate the LA max to the required level (see data sheet at the end of the report).

The type of ventilation fitted will depend also upon the number of air changes per hour that are required by Building Regulations – this is beyond the scope of this report – however suppliers of suitable acoustically treated ventilation systems can be found on the following web sites;

www.passivent.com

These supply vents that fit into the window header and can be acoustically treated or:

www.vents.com

supply core vents that are wall mounted.

Both these types of vent will be suitable acoustically provided that they meet the minimum attenuation requirements for the attenuation.

Or any ventilation unit having a quoted $D_{n,ew}$ in excess of **27 dB**

It is important that the windows are correctly fitted into the wall – gaps and holes around the frames must be kept to a minimum and those that occur must be fully sealed with a high density sealer – on no account must light weight expanding foams be used.

In general the construction of the building must be undertaken with great care as even small gaps will reduce the attenuation provided by the structure and even if a complete wall, which may have an attenuation of 50 dBA has a hole in it equivalent to 1/1000 of the wall area the effective attenuation of the wall is limited to a maximum of 30 dBA.

The actual area of the window in the wall affects the internal noise level: the greater the window area the higher the internal noise level. In general a normal double skinned brick wall will have an attenuation of 45/50 dBA .

The attenuation of the external wall can be reduced by in excess of 5 dBA if the area of the windows is of the order of 25%. The type of glazing then becomes important.

When the windows are open the only important consideration is the area of the opening: if it is 10% of the total area the noise attenuation will be of the order of 12 dBA regardless of the construction of the remaining 90% of the wall.

With regard to the roof, which is a Kingspan panel with the First Floor rooms double boarded an attenuation of 45 dB has been calculated.

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that – in the above case – *windows closed*

Perception Not Noticeable	Examples of Outcome No effect	Increasing Effect Level No observed Effect	Action No Specific Measures required
Noticeable and not Intrusive	Noise can be heard – does not cause any change in behaviour or attitude	No Observed Adverse Impact	No Specific Measures required
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and / or attitude – affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Impact	Mitigate and reduce to a minimum.

The Perception at the residential property being highlighted.

The residential properties are screened from any rail noise by the development itself and as no train movements were audible then no assessment of this source was undertaken.

External Private Amenity Areas

There are no external private amenity areas at the proposed site.

Rail Noise

Wrexham Station and the associated track systems are in the same neighbourhood as the proposed development being directly behind and to the East

The tracks are sited at a distance of approximately 100m from the proposed development (Reference : Google Earth).

Noise measurements were not undertaken specifically regarding rail noise but any contribution from this source will be included in the overall measured levels detailed above. During our time on site we were not aware of any significant contribution from this source.

The noise level generated by railways is dependant upon the speed of the train, the number and type of carriages and the frequency of the various trains.

From previous measurements on the West Coast mainline with respect to Calculation of Rail Noise 1995 a level of **63 dBA** was calculated for the hours 07.00 to 23.00. This is only used as an example as this measurement was on a section of track where the trains passed at speed.

If however, this figure is used to estimate the possible noise level at the proposed site the following results : $63 - 20 \log 100 / 8$ (approximate measurement distance) = **41 dBA**.

As can be seen the proposed development is screened from the rail track by the commercial property to the rear of the proposed apartments which will afford an attenuation to the rail noise.

According to **BS 5228 : Part1 : 2009 Section F.2.2.2.1 Section C** an attenuation to the noise from this source of the order of 5 to 10 dBA expected – as the track is not actually visible then an attenuation of 10 dBA is assumed – if this is the case then the noise level at the residential properties could be of the order of **31 dBA**.

It should be stressed that this can only be regarded as an indication of the likely level of rail noise at the proposed site.

Conclusions

- Occasional noise from the operation of BD Performance was audible at the proposed site – this consisted of car movements – deliveries and noise from the garage. - together with delivery noise / collection at Wrexham Carpets.
- There was no evidence of rail noise apart from the occasional train hooter.
- The calculated Rating Level for the proposed site falls within Category B of TAN 11.
- The internal noise levels within the proposed apartments will satisfy the requirements of BS 8233 : 2014 if all the glazing is 6 / 6 to 20mm / 6mm IGU's
- The ventilation provided must have a minimum attenuation of $D_{n,ew} = 27$ dB

Recommendations

That if the glazing / ventilation is fitted as detailed above that Planning Permission is granted for the three residential apartments

Roger Leach AMIOA

Dated : June 2019



Pilkington Optiphon™

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				

Configuration single glazing

6.8 mm Pilkington Optiphon™	21	26	31	35	37	38	35(-1;-3)	35	34	32
8.8 mm Pilkington Optiphon™	24	28	34	38	37	43	37(-1;-4)	37	36	33
10.8 mm Pilkington Optiphon™	28	31	36	38	39	47	38(-1;-2)	38	37	36
12.8 mm Pilkington Optiphon™	30	32	37	39	41	51	39(-0;-2)	39	39	37
16.8 mm Pilkington Optiphon™	29	34	37	39	46	55	40(-0;-2)	40	40	38

Configuration Insulating Glass Unit (IGU), thickness in mm

6 / 6 to 20 mm / 6.8 Pilkington Optiphon™	23	24	34	42	43	52	38(-2;-5)	38	36	33
6 / 6 to 20 mm / 8.8 Pilkington Optiphon™	24	26	40	48	46	54	41(-3;-7)	41	38	34
6 / 6 to 20 mm / 10.8 Pilkington Optiphon™	23	28	41	47	45	55	42(-3;-7)	42	39	35
6 / 6 to 20 mm / 12.8 Pilkington Optiphon™	20	29	43	47	46	49	42(-3;-8)	42	39	34
8.8 Pilkington Optiphon™ / 6 to 20 mm / 12.8 Pilkington Optiphon™	26	36	46	50	52	63	47(-2;-7)	47	45	40
16.8 Pilkington Optiphon™ / 6 to 20 mm / 16.8 Pilkington Optiphon™	29	40	45	47	54	68	48(-2;-6)	48	46	42

The above IGUs with Pilkington K Glass™ on one pane and a 16 mm 90 % Argon-filled cavity achieve a U value of 1.5 W/m² K.

Further information on solar and thermal performance is available on the Pilkington website using the Spectrum program: www.pilkington.com/spectrum

Impact classification EN12600 Class 1(B)1 for all above Pilkington Optiphon™ products

$R_w(C;C_{tr})$ are in accordance with EN717-1

Non Pilkington Optiphon™ glass products. Figures from BS EN 12354

	dB sound reduction index by octave band – Hz						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				

Configuration single glazing

4 mm Float Glass	17	20	26	32	33	26	29(-2;-3)	29	27	26
6 mm Float Glass	18	23	30	35	27	32	31(-2;-3)	31	29	28
8 mm Float Glass	20	24	29	34	29	37	32(-2;-3)	32	30	29
10 mm Float Glass	23	26	32	31	32	39	33(-2;-3)	33	31	30
12 mm Float Glass	27	29	31	32	38	47	34(-0;-2)	34	34	32

Configuration Insulating Glass Unit (IGU), Float glass, thickness in mm

4 / 6 to 20 mm / 4	21	17	25	35	37	31	29(-1;-4)	29	28	25
6 / 6 to 20 mm / 6	20	18	28	38	34	38	31(-1;-4)	31	30	27
6 / 6 to 20 mm / 4	21	20	26	38	37	39	32(-2;-4)	32	30	28
10 / 6 to 20 mm / 4	24	21	32	37	42	43	35(-2;-5)	35	33	30
10 / 6 to 20 mm / 6	24	24	32	37	37	44	35(-1;-3)	35	34	32

Note that these are conservative figures and cover all products by European glass manufacturers.

R_w = Weighted sound reduction. This scale allows for the response of the human ear and could be used for determining a suitable product to reduce noise such as voices.

C = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from music, radio, tv, high speed traffic and other medium to high frequencies.

C_{tr} = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from urban road traffic, disco music and other noises with a large component of low frequencies.

Note that a 3 dB difference is barely discernable, 5 dB is clearly discernable and 10 dB is a doubling or halving of the noise.