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**Environmental Noise Survey
Gutter Hill
Johnstown
Wrexham**

**AB Acoustics
4 Cumbrian Close
Shaw
Oldham**

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Introduction

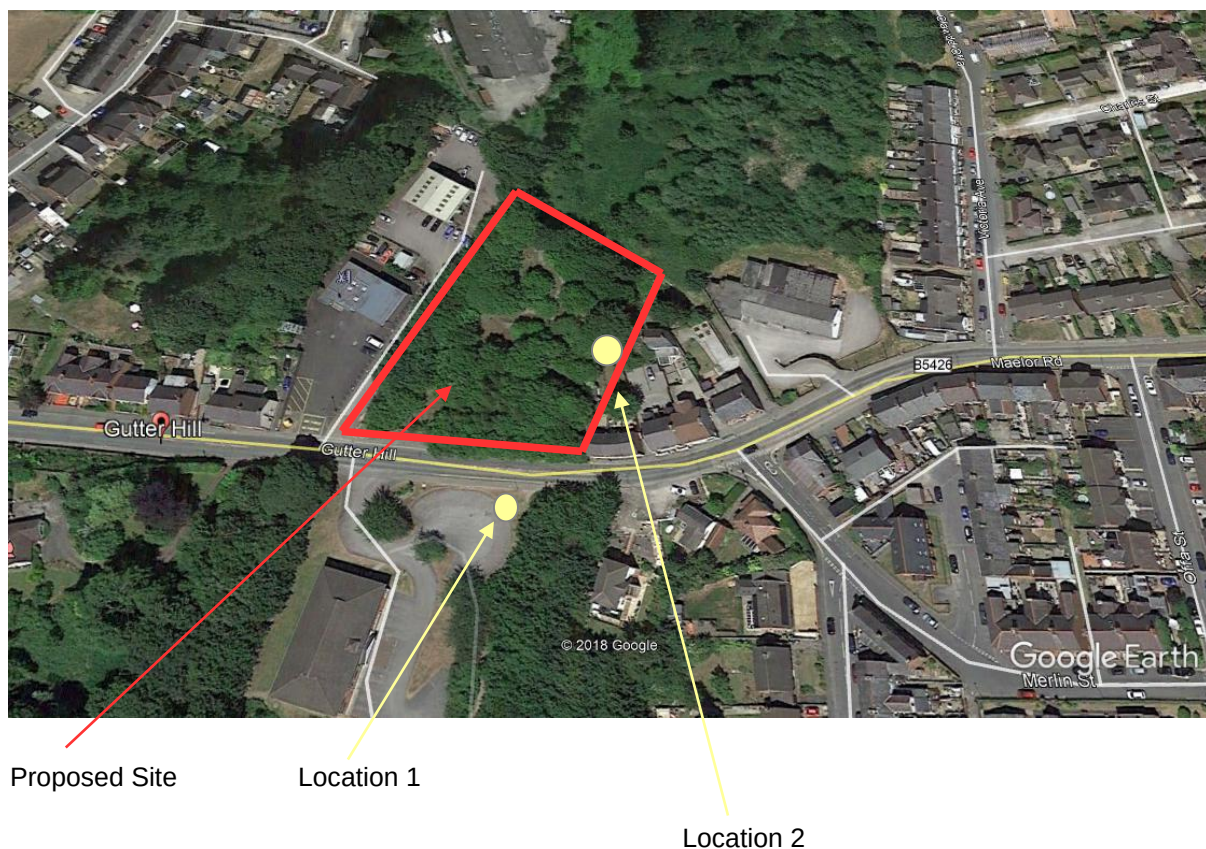
AB Acoustics were commissioned by Design & Planning Associates Ltd to undertake an environmental noise assessment for J C Dyke Supplies of the proposal to build a number of industrial units on vacant land to the East of the Fire Station at Gutter Hill Johnstown Wrexham.

The land is a brown field site which it is hoped to re develop for small starter units for smaller business.

The revised plan is for a single row of 11 units along the Western Boundary of the site as detailed in the plan attached at the end of the report.

It is understood that these units will be constructed from trapizodial panels mounted off a steel framework with access doors to the central yard area.

Below is a photograph of the proposed site with the measurement locations shown. These locations were considered to be representative of the noise level experienced by the existing residential property adjacent to the proposed site. The noise levels were measured and reported in our original report dated June 2019 – it is considered that these noise levels are still representative of those at the proposed site at the present time.



As can be seen from the above the proposed site is adjacent to residential property, the Fire Station at Gutter Hill and an existing commercial development of Wrights Garage.

The proposal is that the Units will be made available for B1 – B8 use.

B1 – Office – Research & Development or any industrial development which can be carried out without causing detriment to the amenity of the area.

B8 – Storage and Distribution.

The following assessment is based on the above.

It is understood that the proposed operating hours are :

Monday to Friday	07.00 - 19.00 hrs
Saturday	07.00 – 19.00 hrs
Sunday and Bank Holidays	09.00 – 17.00 hrs.

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 $L_{Aeq,TdB}$				
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

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 intervals 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 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 an 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.

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.

BS 4142 : 2014

Regarding the residential properties the survey was undertaken – as stated above - with respect to 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 included :

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 with no rain – dry / damp surfaces - 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 measurements were undertaken over a number of days / times in order to obtain – what is considered to be – a representative measurement of the existing noise climate at this location.

Therefore taking the above into account it is considered that the uncertainty has been controlled as far as practically possible with the results being over predicted rather than under predicted and therefore the above represents a robust assessment.

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 arise 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.'

BS 8233 : 2014

The above standard is used to assess noise within residential property and in 'private amenity areas' that can be attached to these properties. They are used to assess the design of new buildings (or refurbishment) rather than assess the effects of changes to the external noise.

However it is recognised that this is not always achievable in existing areas such as City Centres or adjacent to existing commercial development.

In such cases it is suggested that a compromise between the possible raised noise level and the advantages of the commercial development should be reached – therefore any development should be designed to achieve the lowest practical noise level and should not necessarily be prohibited.

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 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 at a height of 1500mm above the ground and away from reflecting surfaces.

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

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

Results

These are tabulated below :

The measurements were undertaken over a number of days in order to obtain a more robust assessment.

Date	Wind Speed M/sec	Wind Direction	Temperature C	Rain	Cloud Cover %	Road Conditions
Friday 24.05.2019	1.3	SE	14	No	100	Dry
Monday 10.06.2019 Start	2.1	E	16	No	60	Dry
Monday 10.06.2019 End 15.50	-	-	14	Heavy	100	Wet
Tuesday 18 June 2019	-	-	14	No	100	Dry

Date	LA eq	LA 90	LA 10	LA max
Friday 24.05.2019 16.00 – 17.00 Location 2	58.3	44.3	54.9.	-
17.10 – 18.00 Location 1	60.7	45.4	63.8	-
Monday 10.06.2019 09.30 – 10.30 Location 1	65	49.5	68.5	
10.30 – 11.30 Location 1	62.7	48	66	
13.15 – 14.15 Location 1	61.1	49.1	65	
14.30 – 15.30 Location 2	61.8	47	55.5	
15.30 – 15.50 Location 2 End – Rain	59.6	47.1	56.2	
Tuesday 18 June 2019 Location 1	63	47.5	65.9	

Over the measurement period the average LA eq is calculated to be **63 (62.7) dBA at Location 1** and **60 (60.1) dBA at Location 2.**

At Location 1 the major source of noise was the traffic movement along Gutter Hill.

At Location 2 this again was the main source of noise but noise was also audible from operations at Wrights Garage.

The lowest measured background was **44.3 dBA** at Location 2 and **45.4 dBA** at Location 1

Units – Possible B1 and B8 usage

The use to which these units can be put is varied and therefore the internal noise level within the Units could also vary..

In the discussion the following noise levels, from library figures, are used :

Internal Measurements

B1 – Office / Research & Development.

The noise in offices by their very nature is low.

B8 - Storage / Distribution

The following are library figures for the internal noise levels within the units. These are used as the actual usage of the units is unknown at the present time.

Location	Measurement Period	LA eq
Decopart Nelson	1 hour	81 (81.3) dBA
Salt Union Winsford	1 hour	79 dBA
KDS Distribution	1 hour	72 dBA
V Supplies	1 hour	59 dBA

As can be seen the above measured noise levels vary , the highest recorded being **81 dBA** – but the average level being **77 dBA** .

The Units are all approximately the same size – having dimensions of 5.1m wide – 2.5m high (at the rear) and 9.2m long.

In the following assessment it should be noted that no account has been made for the variation in distance of the Units from the residential properties considered and the 'nearest' Units have been used.

This therefore can be regarded as the 'worst case situation' as the noise level from the various Units will be attenuated by the increase in distance from the noise source.

Assessment Re 27 Gutter Hill.

The noise from the proposed Units will be radiated by the Front facade which is a Roller Shutter door – roof and roof lights at this location.

This property has been scaled at 46m from the front facade of the proposed units

Front Facade – Roller Shutter Door

The noise level at the residential properties can be determined from -

$$L_2 = L_1 - 6 - R + 10 \log S - 11 - 20 \log r + DI$$

Where

L_2 = Calculated level at distance r metres

L_1 = Internal Level within building. This is assumed to be **81 dBA** (average = **77 dBA**) and could be regarded as the *worst case situation* as it is unlikely that this level will be the noise level within the whole of the building – See above

R = the sound reduction index of the building element (Roller Shutter Door) which in this case is assumed to be **18 dBA** – see enclosed data sheet

S = surface Area of building facing the residential property (Roller Shutter Door)) = $5.1 \times 2.5 = 12.75 \text{ sq m}$

r = distance to houses (Number 27 Gutter Hill) = **46 m** – this is the scaled distance to the nearest residential property – Location 1

DI = Directivity Index = **3**

$$L_2 = 81 (77) - 6 - 18 + 10 \log 12.75 - 11 - 20 \log 46 + 3$$

$$\mathbf{L_2 = 27 / 23 dBA.}$$

Roof

With respect to the roof the average distance of the roof area has been used (scaled at 5m) and the directivity factor is changed to – 3 dB for a plane radiator at $60^\circ < X < 90^\circ$ incidence. Therefore the average distance of the roof is at 51m from the residential property. Using a type 3R roof construction with a quoted $R_w = 46 \text{ dB}$ – area = 47 sq m

Therefore from the above the calculated level with respect to the roof **$L_2 = 0 \text{ dBA}$** reference an internal level of 81 dBA

It is usual to fit in the roof – roof lights – the usual area being 10% of the total area therefore in this case 4.7 sq m with (For Filon GRP Roof Light) an attenuation of 24 dBA. Therefore the noise level due to the roof lights **$L_2 = 10 / 6 \text{ dBA}$**

Therefore the overall level from a Unit is the sum of the above $27 + 0 + 10 = \mathbf{27 \text{ dBA}}$ for an internal level of 81 dBA

For an average internal level of 77 dBA the overall level = **23 dBA**

However, the residential property is unlikely to be affected by the noise from just 1 of the Units. If it is assumed that the residential property will be affected by noise from a number of Units then the following levels are calculated :

Number of Units	Calculated dBA
1	27 / 23 dBA
2	30 / 26 dBA
3	32 / 28 dBA
6	35 / 31 dBA
11	37 / 33 dB

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The above calculation is for the operation of the Units with the Roller Shutter doors closed.

The following is an assessment of the above operation with respect to BS 4142 : 2014 for the No. 27.

Results		Clause	Comment
Calculated ambient sound level	LA eq (1 hr) = 37 / 23 dBA	7.1 7.3.1	Specific sound source active and generally unaffected by other sound sources
Residual Sound Level	LA eq (1 hr) = 63 dBA	07/03/03	Specific sound source not active
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8.1.3 8.3	Deemed to be representative of existing level
Assessment made during day time – reference time interval 1 hr.			
Specific Sound Level	LA eq(60 minutes) = 37 / 23 dBA	7.3.4 7.3.5	
Acoustic feature correction	3 + 2	9.2	Impulsive / Tonal noise 'Just Perceptible'.
Rating Level	37 / 23 + 3 + 2 = 42 / 28 dBA	9.2	Sound
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8	Lowest level measured
Excess of Rating Level over Background	42 / 28 – 44.3 = -2.3 / -16.3 dBA	11	
Assessment indicates no adverse impact		11	
Uncertainty of the assessment	Not Significant	11	

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

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 No. 27 is highlighted

If the Units operate with the doors open the following noise levels are calculated :

The only consideration will be the noise radiated by the open door – at a distance of 46m the noise level at No. 27 will be $81 / 77 - 20 \log 46 = 81 / 77 - 33 = \mathbf{48 / 44 \text{ dBA}}$

However, the residential property is unlikely to be affected by the noise from just 1 of the Units. If it is assumed that the residential property will be affected by noise from a number of Units then the following levels are calculated :

Number of Units	Calculated dBA
1	48 / 44
2	51 / 47
3	53 / 49
6	56 / 52
11	58 / 54

It is also worth noting that the calculated noise level if a large number of Units are operative is in excess of The World Health Organisation Guidelines for noise in 'private amenity areas'.

The following is an assessment of the above operation with respect to BS 4142 : 2014 for the No. 27. with the Roller Shutter doors open

Results		Clause	Comment
Calculated ambient sound level	LA eq (1 hr) = 58 / 44 dBA	7.1 7.3.1	Specific sound source active and generally unaffected by other sound sources
Residual Sound Level	LA eq (1 hr) = 63 dBA	07/03/03	Specific sound source not active
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8.1.3 8.3	Deemed to be representative of existing level
Assessment made during day time – reference time interval 1 hr.			
Specific Sound Level	LA eq(60 minutes) = 58 / 44 dBA	7.3.4 7.3.5	
Acoustic feature correction	3 + 2	9.2	Impulsive / Tonal noise 'Just Perceptible'.
Rating Level	58 / 44 + 3 + 2 = 63 / 49 dBA	9.2	Sound
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8	Lowest level measured
Excess of Rating Level over Background	63 / 49 – 44.3 = 18.7 / 4.7 dBA	11	
Assessment indicates significant adverse impact		11	
Uncertainty of the assessment	Not Significant	11	

As can be seen the impact of operating the Units with the doors open varies with respect to the actual number of Units operating with them open

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No effect	No observed Effect	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	Observed Adverse Impact	Mitigate and reduce to a minimum.

	is a perceived change in the quality of life.		
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The Perception at No. 27 is highlighted

Assessment Re Residential to rear of Grapes Inn (14A)

If the above is repeated for the residential property to the rear of the Grapes Inn which is scaled at a distance of 41m from the proposed site then the following results.

Roller Shutter Doors – L2 = **28 / 24 dBA** : Roof L2 = **0 dBA** : Roof Lights L2 = **10 / 6 dBA** resulting in an overall calculated level L2 = $28 + 0 + 10 = 28 \text{ dBA}$ for an internal level of 81 dBA .

Or for an internal level of 77 dBA = $24 + 0 + 6 = 24 \text{ dBA}$

However, the residential property is unlikely to be affected by the noise from just one of the Units. If it is assumed that the residential property will be affected by noise from a number of Units then the following levels are calculated :

Number of Units	Calculated dBA
1	28 / 24
2	31 / 27
3	33 / 29
6	36 / 32
11	38 / 34

The following is an assessment of the above operation with respect to BS 4142 : 2014 for the residential properties at 14A

Results		Clause	Comment
Calculated ambient sound level	LA eq (1 hr) = 38 / 24 dBA	7.1 7.3.1	Specific sound source active and generally unaffected by other sound sources
Residual Sound Level	LA eq (1 hr) = 63 dBA	07/03/03	Specific sound source not active
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8.1.3 8.3	Deemed to be representative of existing level
Assessment made during day time – reference time interval 1 hr.			
Specific Sound Level	LA eq(60 minutes) = 38 / 24 dBA	7.3.4 7.3.5	
Acoustic feature correction	3 + 2	9.2	Impulsive / Tonal noise 'Just Perceptible'.
Rating Level	$38 / 24 + 3 + 2 = 43 / 29 \text{ dBA}$	9.2	Sound
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8	Lowest level measured
Excess of Rating Level over Background	$43 / 29 - 44.3 = -1.3 / -15.3 \text{ dBA}$	11	

Assessment indicates no adverse impact		11	
Uncertainty of the assessment	Not Significant	11	

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

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 No. 14A is highlighted

If the Units operate with the doors open the following noise levels are calculated :

The only consideration will be the noise radiated by the open door – at a distance of 41m the noise level at No. 14A will be $81 / 77 - 20 \log 41 = 81 / 77 - 32 = 49 / 45 \text{ dBA}$

However, the residential property is unlikely to be affected by the noise from just 1 of the Units. If it is assumed that the residential property will be affected by noise from a number of Units then the following levels are calculated :

Number of Units	Calculated dBA
1	49 / 45
2	52 / 48
3	54 / 50
6	57 / 53
11	59 / 55

It is also worth noting that the calculated noise level if a large number of Units are operative is in excess of The World Health Organisation Guidelines for noise in 'private amenity areas'.

The following is an assessment of the above operation with respect to BS 4142 : 2014 for the No. 14A with the Roller Shutter doors open

Results		Clause	Comment
Calculated ambient sound level	LA eq (1 hr) = 59 / 45 dBA	7.1 7.3.1	Specific sound source active and generally unaffected by other sound sources
Residual Sound Level	LA eq (1 hr) = 63 dBA	07/03/03	Specific sound source not active
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8.1.3 8.3	Deemed to be representative of existing level
Assessment made during day time – reference time interval 1 hr.			
Specific Sound Level	LA eq(60 minutes) = 59 / 45 dBA	7.3.4 7.3.5	
Acoustic feature correction	3 + 2	9.2	Impulsive / Tonal noise 'Just Perceptible'.
Rating Level	59 / 45 + 3 + 2 = 64 / 50 dBA	9.2	Sound
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8	Lowest level measured
Excess of Rating Level over Background	64 / 50 – 44.3 = 19.7 / 5.7 dBA	11	
Assessment indicates significant adverse impact		11	
Uncertainty of the assessment	Not Significant	11	

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No effect	No observed Effect	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	Observed Adverse Impact	Mitigate and reduce to a minimum.

	in the quality of life.		
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The Perception at No. 14A is highlighted

Assessment Re 43 Gutter Hill.

It should be noted that this property is immediately adjacent to the access road to the Fire Station and the commercial garage to the rear.

The noise from the proposed Units will be radiated by the rear wall – roof and roof lights at this location.

This property has been scaled at 25m from the site boundary – the property is at a raised level to the site and in fact part of the rear facade of the proposed units will be screened from the No. 43 by the existing retaining wall – the effect of this screening is ignored in the following in order to achieve a more robust assessment.

Repeating the calculations for No. 43 at a distance of 25m the following results - as the property is at a raised level to the proposed development the Directivity Factor remains at + 3.

The noise level at the residential properties can be determined from -

$$L_2 = L_1 - 6 - R + 10 \log S - 11 - 20 \log r + DI$$

Where

L_2 = Calculated level at distance r metres

L_1 = Internal Level within building. This is assumed to be **81 dBA** (average = **77 dBA**) and could be regarded as the *worst case situation* as it is unlikely that this level will be the noise level within the whole of the building – See above

R = the sound reduction index of the building element which in this case is assumed to be **40 dBA** – see enclosed data for the 9W on data sheet

S = surface Area of building facing the residential property (wall) = $5.1 \times 2.5 = 12.75$
sq m

r = distance to houses (Number 43 Gutter Hill) = **25 m** – this is the scaled distance to the nearest residential property – Location 1

DI = Directivity Index = **3**

$$L_2 = 81 (77) - 6 - 40 + 10 \log 12.75 - 11 - 20 \log 25 + 3$$

$$L_2 = 10 / 6 \text{ dBA.}$$

With respect to the roof the average distance of the roof area has been used (scaled at 5m) and the directivity factor is changed to – 3 dB for a plane radiator at $60^\circ < X < 90^\circ$ incidence.

Therefore from the above the calculated level with respect to the roof **L2 = 2 dBA** reference an internal level of 81 dBA

It is usual to fit in the roof – roof lights – the usual area being 10% of the total area therefore in this case 4.7 sq m with (For Filon GRP Roof Light) an attenuation of 24 dBA. Therefore the noise level due to the roof lights **L2 = 14 /10 dBA**

Therefore the overall level from a Unit is the sum of the above **10 + 2 + 14 = 16 dBA** for an internal level of 81 dBA

For an average internal level of 77 dBA the overall level = **12 dBA**

However, the residential property is unlikely to be affected by the noise from just one of the Units. If it is assumed that the residential property will be affected by noise from a number of Units then the following levels are calculated :

Number of Units	Calculated dBA
1	16 / 12 dBA
2	19 / 15 dBA
3	21 / 17 dBA
6	24 / 20 dBA
11	26 / 22 dBA

The following is an assessment of the above operation with respect to BS 4142 : 2014 for 43 Gutter Hill –

Results		Clause	Comment
Calculated ambient sound level	LA eq (1 hr) = 26 / 12 dBA	7.1 7.3.1	Specific sound source active and generally unaffected by other sound sources
Residual Sound Level	LA eq (1 hr) = 63 dBA	07/03/03	Specific sound source not active
Background Sound Level	LA 90 (1 hr) = 44.3dBA	8.1.3 8.3	Deemed to be representative of existing level
Assessment made during day time – reference time interval 1 hr.			
Specific Sound Level	LA eq(60 minutes) = 26 / 12 dBA	7.3.4 7.3.5	
Acoustic feature correction	3 + 2	9.2	Impulsive / Tonal noise 'Just Perceptible'.
Rating Level	26 / 12 + 3 + 2 = 31/17 dBA	9.2	Sound
Background Sound Level	LA 90 (1 hr) = 44.3 dBA	8	Lowest level measured
Excess of Rating Level over Background	31/17 – 44.3 = --13.3 / -27.3 dBA	11	
Assessment indicates no adverse impact		11	
Uncertainty of the assessment	Not Significant	11	

Note the above is based on the lowest background level measured.

If the units operate with the doors open then this type of operation is totally screened from the residential property by the Units themselves and has therefore been regarded as insignificant.

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that :

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.

With respect to BS 8233 : 2014 it is recognised that the levels specified are not always achievable in existing areas such as City Centres or adjacent to existing commercial development.

In such cases it is suggested that a compromise between the possible raised noise level and the advantages of the commercial development should be reached – therefore any development should be designed to achieve the lowest practical noise level and should not necessarily be prohibited.

Vehicle Noise

An additional noise on the proposed site will be that of vehicles accessing the site either of people working on the proposed site or collections / deliveries to site.

The noise from this source can only be estimated as the actual number of vehicles using the proposed site is unknown. However, it is worth noting that the character of the noise from this source will be very similar to the character of the existing noise from the vehicle movements along Gutter Hill.

Cars

There are 11 units proposed for the site. It is assumed that ALL these will be occupied as the cars arrive in the morning and then depart in the early evening. It is also assumed that there could be 2 cars per unit resulting in a possible total of 22 cars.

The noise levels from different car types have been measured and are detailed below ;

From previous measurements undertaken on car movement of a car park the following levels were recorded :

Vehicle Type	LAeq	LA max
Rover 75	63.8	68.5
Transit Van	64.9	79.3
Volvo	63.8	71.4
Mercedes	66.1	78.7
BMW	67.8	78.7

All the above measurements were carried out at a height of 1.5m and at a distance of 2.0m from the source – these levels are for a car arriving – the driver getting out and closing the door and then returning – opening the door starting the engine and driving off. Therefore in effect they are for twice the operation that would occur in the morning or evening so therefore they can be regarded as the 'worst case situation'.

If it is assumed that half of the above cars – 11 – could arrive / depart in any one hour at the start / end of the working day and it is assumed that the noisiest car is used the **LA eq = 67.8 dBA** and that there are 11 of them then the calculated level of the total car arrivals / departures = $67.8 + 10 \log 11 = 78\text{dBA}$.

The centre of the proposed site is scaled at the following distances from the three residential properties of interest (as shown on the above plan)

27 Gutter Hill = 23m
Rear of Grapes P/H = 20 m
43 Gutter Hill = 57 m

Therefore from $\text{SPL} = \text{Level} - 20 \log R / r$ where $r = 2\text{m}$ and $R = \text{distance to houses}$ the following is calculated.

27 Gutter Hill = $78 - 20 \log 23 / 2 = 57 \text{ (} 56.7 \text{) dBA}$
Rear of Grapes P/H = $78 - 20 \log 22 / 2 = 57 \text{ (} 56.7 \text{) dBA}$
43 Gutter Hill = $81 - 20 \log 57 / 2 = 49 \text{ (} 48.9 \text{) dBA}$.

However, the residential properties will be screened to varying degrees from the proposed 'yard' – 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.

The cars are only partially visible to the rear 27 Gutter Hill and to 14A as the yard and rear of the property has a height difference of approximate 5m then an attenuation of 5 dBA is assumed. If this is the case then the noise level at the residential properties could be of the order of **52 / 52 dBA respectively**.

As 43 Gutter Hill is at a raised level but will be partially screened by the Units themselves therefore an attenuation of 5 dBA has been assumed resulting in a calculated Sound Pressure Level of **44 dBA**.

These calculated noise levels due to car movements in the 'yard' at the proposed development are well below the measured LA eq noise level at Location 2 of 60 dBA and therefore their effect will be insignificant.

It is also worth noting that noise from the above events will be of the same acoustic character as the existing noise environment and therefore should not appear as intrusive.

Delivery / Collection Lorries

No information is available as to the number or type of lorry that will deliver or collect goods to / from the proposed site.

However, from previous measurements on vehicles of this type an estimate can be made using the following information – these measurements include the contribution from vehicle reversing alarms :

Location	Measurement Period	Measurement Distance	LA eq
J Freight Rochdale	3 minutes 12 seconds	2m	70.2
Howarth Bros Harrogate	5 minutes	2m	71.5
Urban Skip Hire Salford	1.4 minutes	2m	75.7

Taking an average level from the above of **73 dBA** the following is calculated with an average movement time of 3.2 minutes or 0.05 hrs

The noise level at the residential properties can be calculated from $SPL = \text{Source Level} + 10 \log T$ with the corrections used above for both distance and screening.

Location	Calc SPL dBA	Attenuation due to distance	Attenuation due to screening	Overall Level dBA
No. 27	60	21	5	34
14 A	60	21	5	34
No.43	60	29	5	26

The above calculated sound pressure levels at the properties are for 1 delivery /collection per hour – below is the calculated level for differing numbers of delivery / collections.

Location / Number/hr.	No. 27	Rear of Grapes PH	No.43
1	34	34	26
2	37	37	29

3	39	39	31
4	40	40	32

Again as can be seen the calculated noise level at the residential properties for the collection / delivery of goods is well below the measured LA eq of 60 dBA and therefore can be considered insignificant with respect to the existing environmental noise level.

The above calculated levels are for Artic type vehicles with curtain sides. It is possible that due to the size of the units on the proposed site it will be more likely that 'Transit' type vans are used. Which as can be seen from the above this recorded a level approximately 10 dBA below the noise levels for the Artic lorries and therefore the resultant noise level could be 10 dBA lower.

It is worth noting that reversing alarms are a safety requirement on any site.

Fork Lift Trucks (FLT's)

From experience on developments of this type it is likely that a number of the units may operate FLT's there contribution is detailed below.

The noise level of a 'typical' FLT has been measured at 70 dBA at a distance of 5.0m. Again assuming that the FLT will operate at the mid point of the proposed yard the following noise levels are calculated :

Taking the noise level of 70 dBA the following is calculated with an average movement time of 5 minutes or 0.08 hrs.

The noise level at the residential properties can be calculated from $SPL = \text{Source Level} + 10 \log T$ with the corrections used above for both distance and screening.

Location	Calc SPL dBA	Attenuation due to distance	Attenuation due to screening	Overall Level dBA
No. 27	59	14	5	40
14 A	59	19	5	35
No. 43	59	21	5	33

The above calculated sound pressure levels at the properties are for 1 movement per hour – below is the calculated level for differing numbers of FLT movements

Location / Number	No.27	14 A	No. 43
1	35	30	33
2	38	33	36
3	40	35	38
4	41	36	39

Again as can be seen the calculated noise level at the residential properties for the movement of FLT's is well below the measured LA eq of 60 dBA and therefore can be considered insignificant with respect to the existing environmental noise level.

Recommendations

- That there are no 'holes' cut into the facade of the Units that face any of the residential properties for ventilation purposes etc
- Any ventilation units / air conditioning units that are mounted in line of sight of the residential property must have a noise output at least 10 dBA BELOW the measured background ie. The noise output must not exceed 34 dBA.
- Wall – these should be constructed from steel trapizodial type panels that have a quoted Rw of at least 40 dB.
- Roof – these should be constructed from steel trapizodial type panels that have a quoted Rw of at least 46 dB
- Roof Lights – the coverage of these should not exceed 10% of the roof area in the individual units and the quoted attenuation of them should be at least $R_w = 24$ dB.
- If it is proposed to operate Fork Lift Trucks on site then the operation of these should not add to the existing noise level – these FLT's should be fitted with 'white noise' reversing alarms.
- All vehicles owned by the occupants of the proposed Units should be fitted with ' White Noise' reversing alarms.
- That Planning Permission is granted with a condition requiri9ng that the Roller Shutter Doors are only opened for delivery and collections . At all other times they are to remain CLOSED.

Conclusions

With respect to the proposed development of starter units at Gutter Hill Wrexham the following results :

- B1 usage will not cause any noise issues.
- B8 usage should not result in any noise complaints provided the buildings are constructed as detailed in the Recommendations
- Cars assessing the site / leaving at the start and end of the working day will not add to the overall existing noise level.
- Deliveries to site should not add to the existing overall noise level.
- If it is proposed to operate Fork Lift Trucks on site then the operation of these should not add to the existing noise level – these FLT's should be fitted with 'white noise' reversing alarms.

- All vehicles owned by the occupants of the proposed Units should be fitted with ' White Noise' reversing alarms.

Roger Leach AMIOA

Acoustic Test Results Appendix A - Wall/Facade Panel Construction

Octave Band Sound Reduction Index (R) and Weighted Sound Reduction Index (R_w)

Wall	Panel and Lining	Octave Band Sound Reduction Index R								R _w	C _r	Surface Weight Kg/m ²
		63	125	250	500	1k	2k	4k	8k			
1W	AWP/60 + no lining	15	16	19	23	26	22	39	–	25	-3	18
2W	AWP/60 + F	12	19	32	42	50	52	60	–	43	-10	30
3W	AWP/60 + W15	14	17	31	40	48	46	56	–	41	-10	28
4W	AWP/60 + W15 + F	17	24	37	45	52	54	64	–	47	-9	40
5W	AWP/60 + P + W12	16	22	37	45	51	50	63	–	46	-10	41
6W	AWP/60 + P + W12	18	23	35	44	49	50	61	–	45	-8	41
7W	AWP/60 + I + P + W	18	24	37	48	53	55	63	–	48	-10	4
8W	KS1000 RW/40 + I + L	13	14	29	38	40	45	55	–	38	-9	20
9W	KS1000 RW/40 + I + L	12	16	30	40	44	51	64	–	40	-9	20
10W	AWP/70 + no lining	20	15	17	23	18	25	40	46	24	-4	12.5

Key

AWP = Architectural Wall Panel with various profiles (Optimo, MR, EB, FL, MM, CX, WV, Longspan)

F = 10mm dense particle board (11.7kg/m²)

W15 = 15mm plasterboard (10kg/m²)

W12 = 12.5mm wallboard (7.9kg/m²)

P = 19mm dense plasterboard plank (15.2kg/m²)

I = Insulation (see construction description for details)

L = 0.7mm profiled steel liner sheet

The figures after the forward slash refers to the panel thickness in mm (ie AWP/60 = panel thickness of 60mm)

Acoustic Test Results Appendix B - Roof Panel Construction

Octave Band Sound Reduction Index (R) and Weighted Sound Reduction Index (R_w)

Roof	Panel and Lining	Octave Band Sound Reduction Index R								R _w	C _s	Surface Weight Kg/m ²
		63	125	250	500	1k	2k	4k	8k			
1R	KS1000 LP/45 + I + 2 x SB	27	32	47	61	69	69	75	–	58	-11	–
2R	KS1000 RW/40 + I + L	8	17	32	43	48	54	60	–	43	–	2
3R	KS1000 RW/40 + I + L	11	19	36	48	54	61	73	–	46	–	19
4R	KS1000 RW/40 + I + Py	17	27	39	44	49	57	67	–	48	–	31
5R	KS1000 RW/30 + no lining	–	17	20	23	23	23	41	–	25	-3	–
6R	KS1000 RW/30 + I + L	–	18	35	50	55	59	60	–	44	-11	–
7R	KS1000 RW/50 + I + L	–	19	34	48	52	56	63	–	44	-10	–
8R	KS1000 RW/80 + I + L	–	20	36	48	50	66	70	–	46	-11	–
9R	KS1000 RW/80 + no lining	–	18	21	23	20	38	42	–	26	-4	–
10R	KS1000 RW/80 + no lining	20	18	20	24	20	29	39	47	25	-3	–
11R	KS1000 RW/80 + I + PL	18	19	22	29	31	40	58	49	32	-4	–
12R	KS1000 ZIP/90 + no lining	19	18	19	20	17	35	38	44	23	-4	–
13R	KS1000 LP/80 + no lining	19	19	19	22	19	35	39	46	24	-4	–
14R	KS1000 RT + no lining	20	19	21	22	22	32	38	44	25	-2	–
15R	KS1000 TS + no lining	20	16	15	23	29	39	45	53	27	-4	27

Key

I = Insulation (see construction description for details)

2 x SB = 2 x 12.5mm dense plasterboard (15.2kg/m²)

L = Profiled Steel Liner Sheet

Py = 10mm thick dense particle board (11.7kg/m²)

PL = Profiled Perforated Steel Liner Sheet

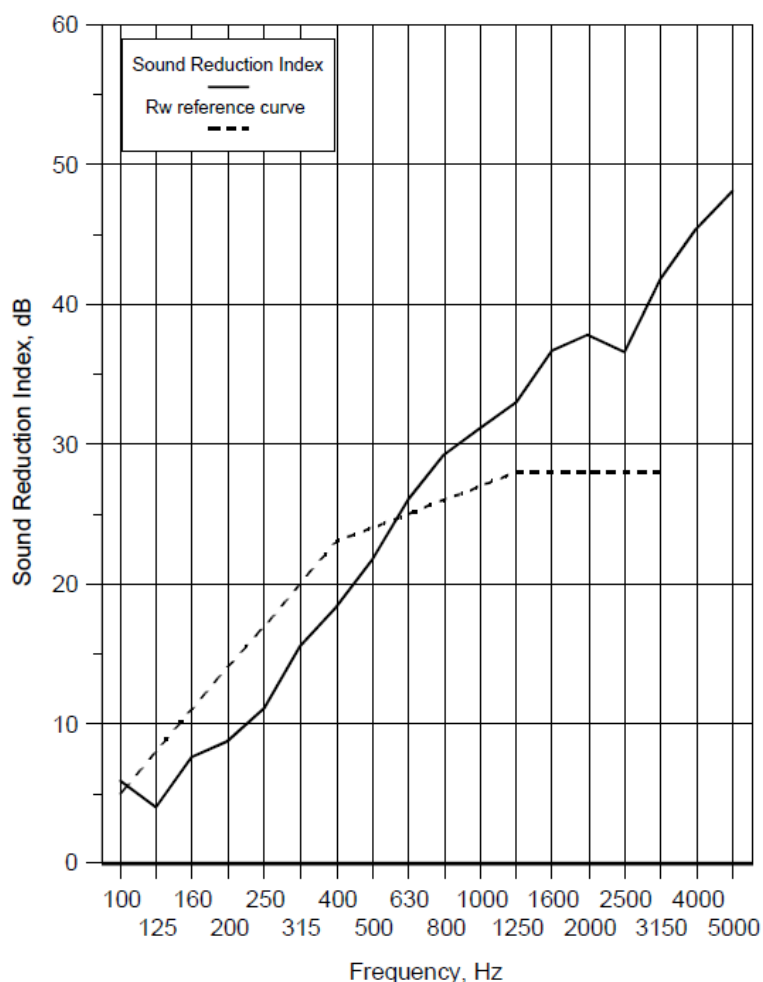
The figures after the forward slash refers to the panel thickness in mm (ie LP/45 = panel thickness of 45mm)

Data Sheet 3

Test Number : 4
Client: Filon Products Limited
Test Date: 20/02/2012
Sample height: 2.19 m
Sample width: 1 m
Product Filon GRP Rooflight
Identification: 2.44kg/m² - film core

Air temperature: 11 °C
Air humidity: 43 %
Receiving room volume: 300 m³
Source room volume: 115 m³
Sample weight: 6.07 kg/m²

Freq f Hz	Sound Reduction Index, dB	
	1/3 Oct	1/1 Oct
50+	12.6	7.6
63+	7.9	
80+	5.1	
100	5.9	5.6
125	4.0	
160	7.6	
200	8.7	11.0
250	11.1	
315	15.5	
400	18.3	21.0
500	21.8	
630	26.0	
800	29.2	30.8
1000	31.1	
1250	33.0	
1600	36.7	37.0
2000	37.8	
2500	36.6	
3150	41.8	44.3
4000	45.4	
5000	48.1	
6300+	53.6	50.3
8000+	53.1 *	
10000+	47.3 *	
Average 100-3150	22.8	Version v1.7



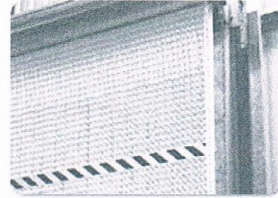
Rating according to BS EN ISO 717-1:1997
 Rw(C;Ctr)= **24 (-2;-7) dB**

* shows measurement corrected for background
 # shows limit of measurement due to background
 + shows frequency beyond standard and not UKAS accredited

Access Door Systems:

Our insulation option provides a 'U' value lower than the 0.7 W/m²K indicated by building regulations. Using the proportional test area method of the CIBS guide, independent calculations by the National Physical Laboratory established a 'U' value of 0.59 W/m²K for the complete door.

The 3mm thick continuous polyurethane foam layer, backed by a silver, wipe-clean aluminised polyester lining is laminated to the inside of the standard door. The combination of the silver surface material and upgraded underlying foam provides aesthetic improvement as well as reducing heat loss and improving the acoustic properties of the door. Informal tests have established a reduction of **15dba** (decibels) through the insulated door curtain.



Kenrick:

Specification

Curtain Weight	=	19.6 k8/sqm
Insulation 'u' value	=	1.21 w/(m sq.k)
optional	=	0.69
Noise reduction	=	18.D.B.
Shutter curtain	=	0.7mm gauge x 100mm deep
Either galvanised, Plastisol or P/coat finish Ral or BS		
Motor Gearbox type	=	G.F.A Safe drive with failsafe gearbox
Average Door Speed	=	225mm per second

