



BRAIDEN ACOUSTICS LTD

Innovation Forum // 51 Frederick Road // Salford // Manchester // M6 6FP

NOISE IMPACT ASSESSMENT (RESIDENTIAL)

Prepared for : Social Value Housing

Date : 7 Apr 2022

Site : 408 Oldham Road, Middleton

Report No. : 11002revA

1 INTRODUCTION

Braiden Acoustics has been commissioned by Social Value Housing to undertake an acoustic survey at the site of 408 Oldham Road, Middleton in order to discharge noise condition(s) of planning application 21/00265/FUL that proposes:

Residential Development comprising the erection of 16 dwellings together with access, associated infrastructure and landscaping (Affordable Housing)

Condition 18 states:

Internal noise levels within the habitable rooms of Plots 1, 2 and 14 shall not exceed the following levels:

- 35 dB(A) Leq (1 hour) in the bedrooms with windows shut and other means of ventilation provided between 7 am and 11pm;
- 30dB(A) Leq 5mins in the bedrooms with windows shut and other means of ventilation provided between 11pm and 7am;
- 35 dB(A) Leq (1 hour) in the living room/s with windows shut and other means of ventilation provided between 7 am and 11pm;
- 40dB(A) Leq (1 hour) in other habitable rooms with windows shut and other means of ventilation provided at all times.

No part of the development shall be occupied until such time as a report providing details of the implemented acoustic mitigation measures and demonstrating that internal noise levels within habitable rooms meet the levels set out above, has been submitted to and approved in writing by the Local Planning Authority. The duly installed mitigation measures shall be retained thereafter.

Reason: In the interests of ensuring a satisfactory standard of residential amenity for future occupiers in accordance with adopted Rochdale Core Strategy policies DM1 and G9 and the National Planning Policy Framework.

1.1 AIM

This report assesses potential noise impact on the proposed residential site from surrounding noise sources and recommends any mitigation acoustic measures, if necessary, so that the above Condition can be discharged.

2 DESCRIPTION OF SITE

The site is a plot of undeveloped land that is to the rear of a Tesco Express car park.



Figure 1
Street View of site looking south east

2.1 SITE LOCATION AND NEIGHBOURING USES

To the west and north east that is existing housing, To the south east there are playing fields for Elm Wood Primary School. Oldham Road, A669, is approximately 40m to the north

2.2 PROPOSED USE

It is proposed to clear the site allowing for a modern residential development comprising of a 16no. houses. The indicative layout is shown in Figure 2.



Figure 2
Proposed site layout

The proposal includes the following amount of accommodation:



- 6 x House Type A (approximate GIA = 72.5 m²)
- 4 x House Type B (approximate GIA = 87.0 m²)
- 6 x House Type C (approximate GIA = 121.0 m²)

Total Residential Units = 16no. dwellings

3 ACOUSTIC CRITERIA AND METHODOLOGY

This is a residential development that may be susceptible to environmental noise. Potential mitigation measures are determined by recommended indoor noise levels from BS 8233 “Sound insulation and noise reduction for buildings” [1] which, in turn, takes guidance from the research based World Health Organisation “Guidelines for Community Noise”.

Noise level thresholds are usually given for the night-time – 2300-0700 hrs and day time – 0700-2300 hrs.

3.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework is the current document for planning guidance. Paragraph 123 of the NPPF says that planning 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.

3.2 BS 8233: 2014

The British Standard BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings” gives guidance on recommended indoor ambient noise levels for residential dwellings.

Room	Criterion	$L_{Aeq,T}$	
		night	day
Bedroom	Sleeping	30	35
Dining Room/Area	Dining	--	40
Living Room	Resting	--	35

Table 1

Recommending indoor ambient noise level thresholds from anonymous noise (taken from Table 4, BS 8233:2014)

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.



Internal noise levels in habitable rooms are calculated using either the simple or rigorous method as described in Annex G in BS 8233:2014.

3.2.1 Noise levels in external living areas

For external living areas such as gardens and balconies, BS 8233:2014 § 7.7.3.2 recommends an upper limit of 55dB $L_{Aeq,day}$ although there is a caveat:

However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.2.2 Maximum noise levels

In the 2014 edition of the Standard, the criterion of 45dB L_{AFmax} inside bedrooms has been removed although there is Note 4:

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 $L_{Amax,P}$ depending on the character and number of events per night. Sporadic noise events could require separate values.

The use of the phrases ‘may be set’ and ‘could require’ imply that this is a discretionary criterion.

3.3 BS 4142

BS 4142:1999 “Method for rating industrial noise affecting mixed residential and industrial areas” [2] assesses industrial noise with regards to nearby residential dwellings. The guidance is commonly used to compare the equivalent noise from an industrial source only (specific noise level), L_{Aeq} , to the background noise level, L_{A90} , at the nearest sensitive receptor (NSR).

This Standard has been recently updated, BS 4142:2014 “Methods for rating and assessing industrial and commercial sound” [3]. Whereas the old standard added 5dB ‘penalty’ to the Specific Noise Level (SNL) if the noise source has a ‘character’ that can draw attention that may be described as tonal, intermittent or impulsive, the new standard gives clearer guidance on noise ‘character’. Furthermore, the previous Standard gave only one 5 dB penalty whereas the new Standard may not. When added to the specific noise level it forms the rating level. The new Standard gives the guidance for the following types of noise character:

Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.

Correct the specific sound level if a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.

NOTE 1 The prominence of tonal or impulsive sound from a source can be masked by residual sound. In many cases the amount of masking varies as the residual sound changes in level and possibly character. The source’s tonal and/or impulsive characteristics could also vary with time.

Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.



Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Once a penalty for noise character is added to the Specific Noise Level then this is termed the Rating Level.

The background level is then compared to the rating level. It is usual that the rating level due to the source should be below the background noise level at the nearest sensitive receptor; indeed BS 4142 states:

“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

3.4 COUNCIL CRITERIA

Rochdale Council’s noise criteria are as follows:

- ☐ 35 dB(A) Leq (1 hour) in the bedrooms with windows shut and other means of ventilation provided between 7 am and 11pm;
- ☐ 30dB(A) Leq 5mins in the bedrooms with windows shut and other means of ventilation provided between 11pm and 7am;
- ☐ 35 dB(A) Leq (1 hour) in the living room/s with windows shut and other means of ventilation provided between 7 am and 11pm;
- ☐ 40dB(A) Leq (1 hour) in other habitable rooms with windows shut and other means of ventilation provided at all times. LAeq 30 dB 8 hours – indoors, night-time (23.00-07.00)

4 MONITORING DETAILS

Noise monitoring took place at the potentially noisiest part of the site, where there would be vehicle movements, including deliveries, for over 30 hours.

4.1 MONITORING DETAILS

Personnel: John Braiden, BSc & MSc Acoustics, MIOA.

Equipment: NTi XL2 integrated real time analyser & B&K 4231 calibrator.



The sound level meter was calibrated before after the measurements with no significant drift reported .

4.2 MONITORING LOCATION

The monitoring location is denoted by a blue arrow in Figure 3.



Figure 3
Monitoring locations

4.3 VISIT 1

Noise measurements focussed on noise from where Tesco Express takes deliveries. There are also car parking places at this location

Weather: 6 – 14°C temperature; ~5ms⁻¹ wind; ~20 - 60% cloud; no precipitation.

Location: microphone approx. 0.5 m from ground and in a free field position.

Monitoring was unmanned.

4.3.1 Results

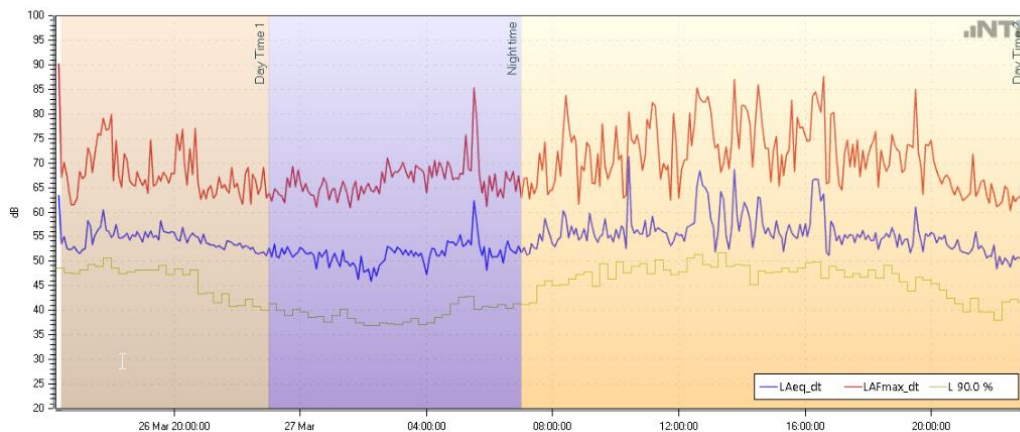


Figure 4
Time history – visit 1

The noise climate consisted of vehicle movements within the Tesco Express car park, birdsong and traffic noise from the surrounding road network.



Date	Time		Duration	Time Period	L _{A90} dB	L _{Aeq} dB	L _{Amax} dB
	Start	Finish					
Fri 26/05/2022	16:25	23:00	06:35	day	44.5	54.8	79.9
	23:00	07:00	08:00	night	38.2	52.2	85.3
	07:00	05:38:28	06:38:28	day	44.2	58.3	87.6

Table 2
Summary of free field noise monitoring results

Even with the birdsong of relatively high levels and nearby vehicular movements, the day and night time L_{Aeq} levels were not excessive and in keeping with a residential area.

5 ACOUSTIC ASSESSMENT

5.1 BS 8233 ASSESSMENT

The required internal noise levels are given in Section 3.4 and the amount of attenuation from the building façades were readily computed using the simple method in Appendix G of BS 8233:2014 whereby the sound insulation index (SRI) of the glazing (the weakest element of the building façade, acoustically) is determined by simply deducting the required internal noise level from the external free field noise level¹.

5.1.1 Façade correction

No façade corrections were necessary as the noise monitoring was free field.

5.1.2 Distance correction

The monitoring location was technically outside the boundary of the site and not at the location of the nearest dwelling (Plot 1).

If the noise source location is deemed to be equidistant to both the site boundary to the south and the rear of the Tesco Express building to the north, then the monitoring location is 7m from this noise source location and the nearest (front) window of Plot 1 is 13m from the noise source location. If it also assumed that the noise is a line source and not a point source (due to vehicular movements in the car park and Oldham Road), then the correction for distance is $10 \cdot \log_{10}(7/13) = -3$ dB

5.1.3 Barrier correction

It is proposed to install a 1.8m high close-boarded fence on the perimeter. This will only impact the ground floor habitable rooms for properties near to the boundary. Hence, no barrier correction is assumed.

5.1.4 Internal noise levels

The planning condition states that L_{Aeq} (1 hour) levels should be used for daytime and that L_{Aeq} (5 min) levels for the night time period.

The graph in Figure 5 shows the L_{Aeq} (1 hour) levels over an approximate 24 hour period. The highest 1-hour level, during the day, is shown to be 62.3 dB L_{Aeq}.

¹ When the measured levels are façade levels, then 3dB is deducted to obtain the free field levels.



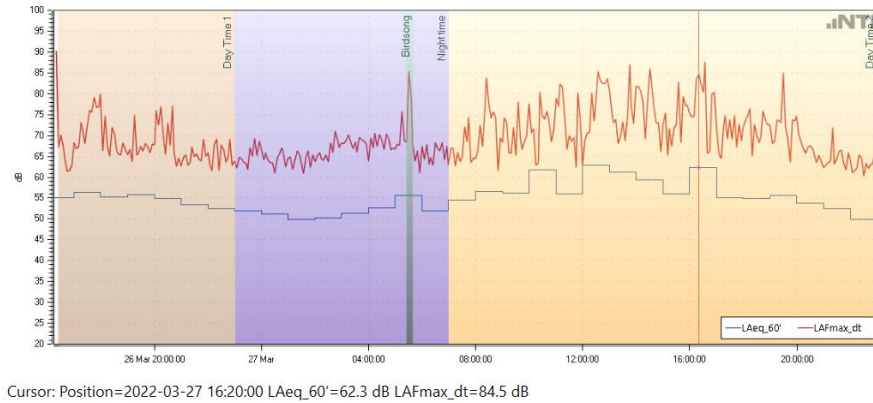


Figure 5
Day and night time monitoring showing highest 60 minute noise level of 62.3 dB L_{Aeq}

The noise monitoring for the night time only is shown in Figure 6. The L_{Aeq} noise levels are now shown every five minutes, as per the planning condition. The highest 5-minute noise level is shown to be 55.4 dB L_{Aeq} .

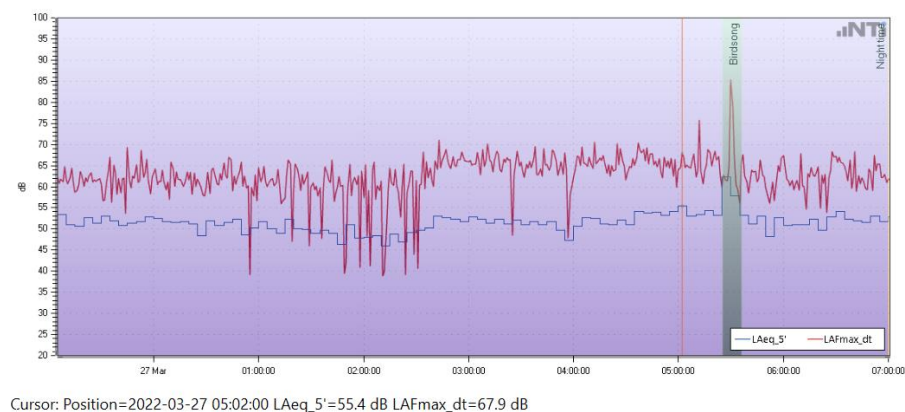


Figure 6
Night time monitoring showing highest 5-minute noise level of 55.4 dB L_{Aeq}

A summary of the day and night noise levels are:

L_{Aeq} (1 hour, day) 62.3 dB

L_{Aeq} (5 min, night) 55.4 dB

When the levels are rounded to the nearest decibel and corrected for distance to the nearest house, the levels become:

L_{Aeq} (day) 59 dB

L_{Aeq} (night) 52 dB

The weakest structural element is the glazing. The required glazing was calculated using recommended internal values and the external façade noise levels above. The Table below shows the required Sound Reduction Indices (SRI) for the bedrooms (night) and living areas (day) on each relevant elevation.

The mitigation applies to the nearest plots to the car park – Plots 1, 2 and 14.



Façade	period	room	External Levels measured / calc'd		Internal Levels recommended		Required glazing	
			L_{Aeq} (dB)	L_{Amax} (dB)	L_{Aeq} (dB)	L_{Amax} (dB)	SRI ($R_w + C_{tr}$)	Example Spec
Plot 1, 2 & 14	night	bedroom	52		30		22	4 / (6-20) / 4
	day	lounge	59		35		24	4 / (6-20) / 4

Table 3
Calculated SRI values and recommended glazing

At the most noise exposed Plots of 1, 2 & 4, adequate internal noise levels can be achieved with standard 4mm double glazing. Standard double glazing is to be installed on all other plots.

5.1.5 Ventilation

For Plots 1, 2 & 14, alternative ventilation is required for habitable rooms.

The Sonair by Titon is a mechanical acoustic vent.

The brochure (see Appendix) states:

Sonair provides mechanical input ventilation when switched on, when switched off provides background trickle ventilation which includes a controllable shutter.



Figure 7
In-situ Titon Sonair acoustic vent

The Sonair unit provides a minimum sound reduction index of 50 dB $D_{n,e,w} + C_{tr}$ – this clearly achieves the minimum required of 24 dB.

The unit can also clean the air via filters. More details can be found at:

https://www.titon.com/uk/products/ventilation-systems/supply_ventilation/sonair/

5.2 NOISE IN GARDENS

The daytime noise level in the gardens nearest to the boundary will be approximately 48 dB(A) when a 1.8m close-boarded timber fence, with a surface density of a minimum of 10 kg/m², is installed as per the drawings.

A boundary treatment with the above specification will achieve a noise reduction of at least 10dB in the gardens, when installed correctly.



The noise level in the gardens of 48 dB is within the acceptable upper noise limit in gardens of 55 dB.

5.2.1 Boundary treatment

The boundary treatment should be a close boarded timber fence with a surface density of 10 kg/m². Locations of the boundary treatment are shown in Figure 2.

6 CONCLUSION

An acoustic survey has taken place at 408 Oldham Road, Middleton to support a planning application for the erection of residential dwellings.

The recommendations are as follows:

- standard double glazing to ALL plots (including 1, 2 & 14)
- Sonair by Titon mechanical acoustic vent for all habitable rooms for plots 1, 2 & 14 only.
- 1.8m close boarded timber fence with a surface density of 10 kg/m² as a boundary treatment

Pending installation of the proposed recommendations above, the internal and external noise levels meet the Council's criteria for noise.

7 REFERENCES

- [1] BS8233: 2014
Sound Insulation and noise reduction for buildings – Code of Practice,
British Standards Institute, 2014.
- [2] BS 4142: 1997
Method for Rating industrial noise affecting mixed residential and industrial areas
British Standards Institute, 1997.
- [3] BS 4142: 2014
Methods for rating and assessing industrial and commercial sound
British Standards Institute, 2014.



Appendix

A1 GLAZING TYPES FROM BS 12354-2

Table B.1 - Examples of the sound reduction index of glazing

Glazing type	Sound reduction index (dB)						
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	R_w (C; C _{tr}) dB
Single panes (mm)							
3	14	19	25	29	33	25	28 (-1; -4)
4	17	20	26	32	33	26	29 (-2; -3)
5	19	22	29	33	29	31	30 (-1; -2)
6	18	23	30	35	27	32	31 (-2; -3)
8	20	24	29	34	29	37	32 (-2; -3)
10	23	26	32	31	32	39	33 (-2; -3)
12	27	29	31	32	38	47	34 (0; -2)
Laminated panes (mm) + plastic laminate (0,5 to 1) mm							
6+	20	23	29	34	32	38	32 (-1; -3)
8+	20	25	32	35	34	42	33 (-1; -3)
10+	24	26	33	33	35	44	34 (-1; -3)
Double pane units with single or laminated panes (mm); air filled cavity from (6 to 16) mm							
4-(6-16)-4	21	17	25	35	37	31	29 (-1; -4)
6-(6-16)-4	21	20	26	38	37	39	32 (-2; -4)
6-(6-16)-6	20	18	28	38	34	38	31 (-1; -4)
8-(6-16)-4	22	21	28	38	40	47	33 (-1; -4)
8-(6-16)-6	20	21	33	40	36	48	35 (-2; -6)
10-(6-16)-4	24	21	32	37	42	43	35 (-2; -5)
10-(6-16)-6	24	24	32	37	37	44	35 (-1; -3)
6-(6-16)-6+	20	19	30	39	37	46	33 (-2; -5)
6-(6-16)-10+	24	25	33	39	40	49	37 (-1; -5)
NOTE 1 This selection and the values are in accordance with prEN 12758-1. The single number ratings are deduced from results in 1/3-octave bands and therefore single number ratings deduced from the given octave band data might result in values which differ 1 dB at the most.							
NOTE 2 Though it is known that for a given double pane unit the sound reduction increases with increasing cavity width, this effect has been found to be too small to take into account here for air filled cavities in the light of the inherent spread in results for nominally identical units.							



Sonair

Acoustic (sound attenuating) filtered air supply units



For use fitted through walls

Sonair provides mechanical input ventilation when switched on, when switched off provides background trickle ventilation which includes a controllable shutter.

Sonair is a wall mounted input fan featuring touch control with an LCD display.

- Sonair F+ ventilates and cleans the air
- Independently tested by the BRE
- Exceptional sound attenuation (up to 56dB*)
- Air cleaning
- Low energy



Features & Benefits

- Meets guidelines for occupant accessibility
- Increase occupant awareness of system operation
- Discreet design
- Supplied with a flexible cable and a 13 amp plug

Performance

Full test details available on request
Input airflow rate (m³/h) – 28-225

Acoustic D_{n,e,w} (*/.) – 55/56* (Sonair F+).

*depends on filter

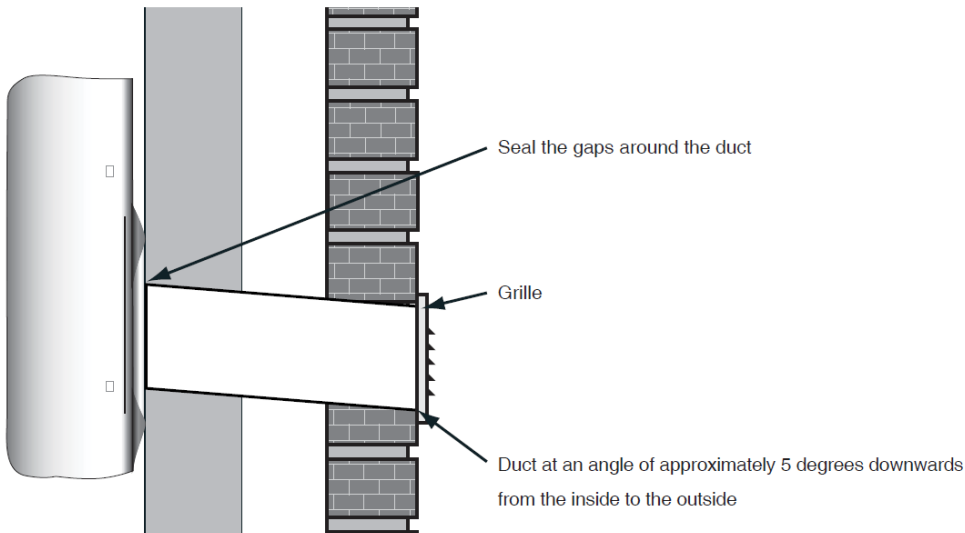
Tested to the 'Noise Insulation Regulations'.

Background ventilation rate of 2500EA when the unit is switched off and the shutter is open.

Product	Product Code
Sonair F+ including G3 Filter	S103SAUK
Sonair Filter G3	F211
Sonair Filter F6	F209



Installation



Acoustics

Acoustics is becoming a more important factor in more densely populated areas, therefore the requirement for sound attenuating ventilators has increased. As standard/acoustic trickle ventilators cannot provide the attenuation levels necessary, more sophisticated solutions are required. The Sonair achieves acceptable noise reducing levels.

Sound Production

Sound pressure level, LpA; 10 m² according to ISO 3741

Capacity	Sonair F+	
	G3 Filter	F6 Filter
30 m ³ /h	<11.5	<19
45 m ³ /h	<18.5	27
60 m ³ /h	23.5	33
90 m ³ /h	34	41.5
140 m ³ /h	43.5	51.5
Sound Attenuation according to ISO 140-10		
D _{o,AW} dB (A)	56	55

Independently tested to requirements of noise insulation regulations.

Dimensions

445 (H) x 310 (W) x 134 (D)

Housing

Plastic ABS white RAL 9003

Voltage

220-240V/50 Hz

Energy Consumption

Max. 13 Watt at 17 l/s (60 m³/hour)

Max. 43 Watt at 62.5 l/s (225 m³/hour)

Ventilation Capacity

Max. 62.5 l/s (225 m³/hour) with a G3 filter

Duct

100 mm (standard)

More information

www.titon.com or 01206 814879

