BRAIDEN ACOUSTICS LTD

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

NOISE IMPACT ASSESSMENT

Prepared For :	Hozan Rahman	Date :	15 Aug 2022
Site :	332 Slade Lane, Levenshulme	Report No. :	11072revA

1 INTRODUCTION

Braiden Acoustics has been commissioned by Hozan Rahman to undertake an acoustic survey at the site of the 332 Slade Lane, Levenshulme in order to support planning permission 134416/FO/2022 which states:

> *"Change of use of three ground floor flats into three independent shop units (Retail Unit / Retail of Office / Hot Food Takeaway), alteration to the ground floor elevation and fenestration"*

Comments from the Environmental Health Team from the council, dated 25/07/2022 have stated that

> *An acoustic assessment is required to demonstrate the impact to adjoining and upper floor occupiers.*

1.1 AIM

This report assesses potential noise impact on nearby residential dwellings and addresses the comments from Environmental Health above.

2 DESCRIPTION OF SITE

The site is the ground floor three units of residential development on the corner of Slade Lane and Moseley Road in Levenshulme.

Figure 1
Proposed site street view

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2.1 SITE LOCATION AND SURROUNDING AREA

The site is bounded by Moseley Road to the south and Slade Lane to the east. To the west is an alleyway with Moseley Court residential apartment block further to the west.

To the north are some commercial units at ground floor with residential accommodation above.

To the south are some commercial units on the opposite corner of Slade Lane and Moseley Road.

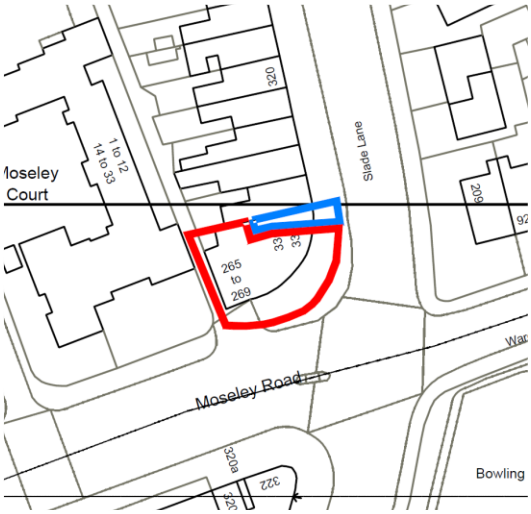

Figure 2
Site location showing neighbours and surrounding uses

2.1.1 Nearest sensitive receptor

The nearest sensitive receivers (NSR) are the existing residential apartments on the upper floors.

2.2 PROPOSED USE

The proposed that the ground floor units will be converted to the following:

- Retail
- Retail / Office
- Hot Food Takeaway.

NB** The assessment shall concentrate on the Hot Food Takeaway only as it is envisaged that there will not be any noise issues with the retail or offices units.

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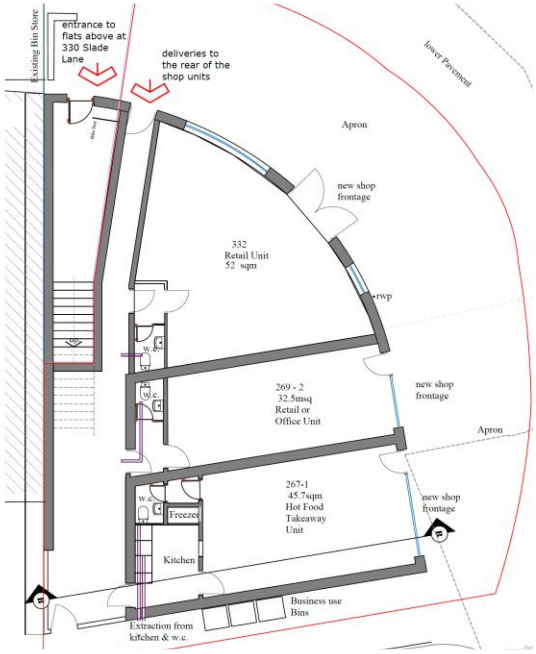

Figure 3
Proposed ground floor layout

2.2.1 Proposed opening hours

The proposed opening hours of the takeaway are:

Daily 10:00 hrs to 22:00hrs

2.2.2 Building services

The exact mechanical services are not yet known as the tenant has not yet been determined. What follows is a typical system for this type and size of use.

The initial proposal for the external plant is as follows:

- kitchen extract duct

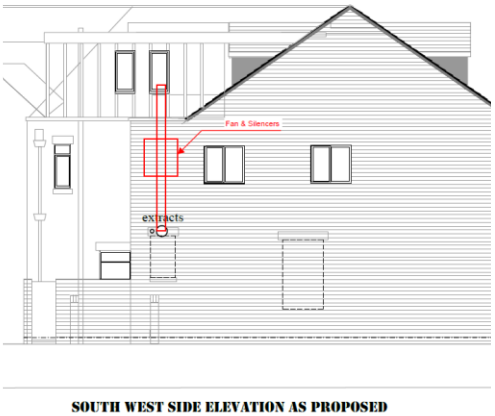

Figure 4
Side elevation showing typical location for external extract flue, fan & silencers.

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2.2.2.1 Kitchen extract

The kitchen extract will likely punch out of the side wall. The duct will rise vertically, that is where the fan, and adjacent silencers either side, will be located. The duct will terminate at least one metre above the eaves.

FAN

The fan will could be a

- Fläktwoods 450mm Long Case e.g. https://www.nfan.co.uk/store/p/45jm1645301ph-long-cased-axial-flow-fan-by-flakt-woods

SILENCER

To be decided by this assessment.

NB** The acoustic assessment will determine the typical specification of the extract fan and silencer.

2.2.3 Sound system

Any sound system shall be modest and only play background music.

3 ACOUSTIC CRITERIA AND METHODOLOGY

Potential mitigation measures are determined by recommended indoor noise levels from BS 8233 "Sound insulation and noise reduction for buildings" [i] 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 daytime – 0700-2300 hrs.

3.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework is the current document for planning guidance. Paragraph 180 of the revised NPPF states:

> *180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum, potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
>
> *c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

Paragraph 180 refers to the Noise Policy Statement for England which shall be briefly discussed in the next Section.

3.2 NOISE POLICY STATEMENT FOR ENGLAND

The main aim of the Noise Policy Statement is to:

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

Therefore, the NPSE is mainly concerned with environmental noise.

The document sets out categories in order to help distinguish is if there is an adverse effect due to noise and if there is, how significant is it.

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

LOAEL – Lowest Observed Adverse Effect Level
This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level
This is the level above which significant adverse effects on health and quality of life occur

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

3.3 BS 4142

BS 4142:1999 "Method for rating industrial noise affecting mixed residential and industrial areas" [ii] 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" [iii]. 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 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.

3.4.1 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.

3.4.2 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 LAmax,P depending on the character and number of events per night. Sporadic noise events could require separate values.

3.5 COUNCIL CRITERIA

3.5.1 Residential noise levels

The noise criteria from condition 8 are as follows:

- *35dB LAeq (16hr) from 0700 to 2300 within living rooms*
- *30dB LAeq (8hr) from 2300 to 0700 within bedrooms*
- *45dB LAFmax (individual noise events shall not exceed 45 dB LAmax,F by more than 15 times) within bedrooms*
- *50dB LAeq (16hr) from 0700 to 2300 for outdoor living areas*

3.5.2 Industrial noise levels

The noise criterion for external plant noise is as follows:

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L Aeq) below the typical background (L A90) level at the nearest noise sensitive location.

4 MONITORING DETAILS

4.1 SITE VISIT 1 – BACKGROUND NOISE

4.1.1 Monitoring details

Personnel:	John Braiden, BSc & MSc Acoustics, MIOA.
Weather:	6-13-°C temperature; ~5ms^{-1} wind; ~20-40% cloud;
Equipment:	NTi XL2 integrated real time analyser & B&K 4231 calibrator.
Date:	Friday 29th July 2022.

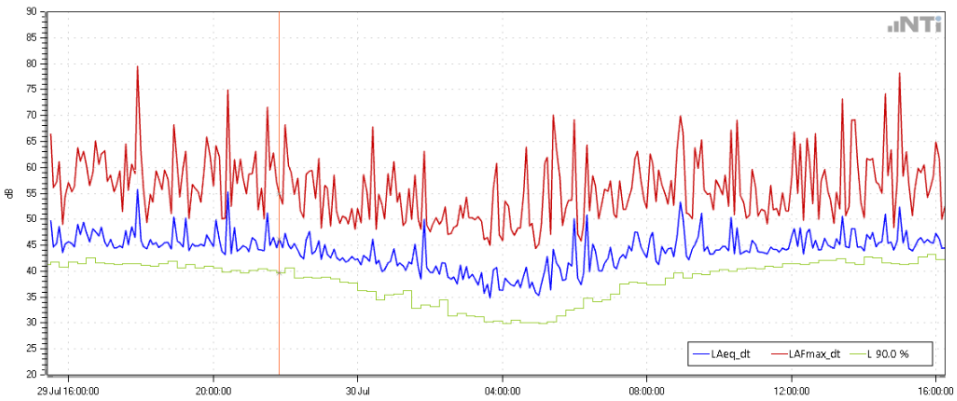
The sound level meter was calibrated before after the measurements with no significant drift reported.

Monitoring was unmanned with audio recorded.

4.1.2 Monitoring location(s)

The sound monitoring equipment was set up on a flat roof to the rear of a first-floor apartment. The local height was 1.2m and the microphone was at least 2m from any other surface.

4.1.3 Results



Cursor: Position=2022-07-29 21:50:00 LAeq_dt=46.2 dB LAFmax_dt=55.0 dB L 90.0 %=39.7 dB

Figure 5
Time history at location 1

The lowest recorded background noise level when the site would be open was 38.7 dB L_{A90}.

4.2 SITE VISIT 2 – SOUND INSULATION TEST

A sound insulation test of the separating floor to the flat above was taken according to relevant Standards and Guidance.

The construction of the separating floor is timber – exact thickness unknown. The condition of the ceiling looked in good condition.

The result from the sound insulation test was at least :

$$44 \text{ dB } D_w + C_{tr}$$

The above figure is a minimum due to background noise.

Building Regulations Part E "Resistance to the passage of sound" state that the sound insulation should be 43 dB or more. Therefore, the separating floor does pass the minimum standard for Building Regulations.

The sound insulation level of the separating floor shall determine the maximum permitted noise level within the take away.

5 ACOUSTIC ASSESSMENT

5.1 BS4142 ASSESSMENT

5.1.1 Extract fan

Duct noise calculations have included the fans' sound power level, type and length of duct, bends, attenuators and end reflection.

Noise propagation has taken account for distance and barrier attenuation due to any shielding, where appropriate.

The assessment location is the nearest residential window to the extract fan. It must be noted that the nearest habitable window is on the side elevation and the extract fan is on the rear elevation.

Full noise propagation calculations are shown in the Appendix.

BS 4142 Noise Assessment EXTRACT	Value	dB
Total Specific Noise Level @ NSR		23
BS 4141		
Tonality	0/2/4/4	0
Impulsivity	0/3/6/9	0
Intermittency	0/3	3
Rating Noise Level		**26**
LAF90_day		37
Rating minus Background		**-11**
Target Met?		✓

Table 2
BS4142 assessment – Extract

The BS4142 assessment shows that the Rating Level of a typical extract duct, at the nearest resident, is 11 dB less than the background and hence well within acceptable limits.

5.2 INTERNAL NOISE TRANSFER

The take away will operate during day time hours, i.e. before 23:00.

The noise level within living rooms should not exceed 35 dB(A) .

The sound insulation of the separating floor is 44 dB.

Therefore, the maximum allowable noise level within the take away is :

79 dB.

This is an acceptable upper limit for take aways and cafes.

5.2.1 Other possible mitigation measures

The condition of the ceiling of the proposed take away should be inspected for any holes / gaps etc. and appropriately filled. In addition, there are the following recommendations:

- down lighters and any other penetrations should be removed and all holes filled with the same type and number of layers of plasterboard and full sealed with acoustic sealant
- there should be no additional penetrations in the ceiling
- only surface mounted services, such as lights, should be used
- any small penetrations, e.g. cables, should be fully sealed with acoustic sealant.

6 CONCLUSION

An acoustic survey has taken place at the 332 Slade Lane, Levenshulme to support a planning application for the conversion of the ground floor to a take away.

A summary of the survey is as follows:

- the Rating Level of a typical extract fan with an Acoustica R02 - 4 - 1500 (Mel) should be 11dB less than the Background Noise Level and thus within and acceptable limit.
- the upper noise limit for the take away is 79 dB(A).

7 References

[i] BS8233: 2014
Sound Insulation and noise reduction for buildings – Code of Practice,
British Standards Institute, 2014.

[ii] BS 4142: 1997
Method for Rating industrial noise affecting mixed residential and industrial areas
British Standards Institute, 1997.

[iii] BS 4142: 2014
Methods for rating and assessing industrial and commercial sound
British Standards Institute, 2014.

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Appendix

A1 Sound Insulation test results

Level difference in accordance with ISO 140-4
Field measurements of airborne sound insulation between rooms

Client: Eddie O'Dodu

Date of test: 15/07/2022

Location: 24 - 26 Wheelock St, Middlewich - GF2FF

Unknown timber floor construction

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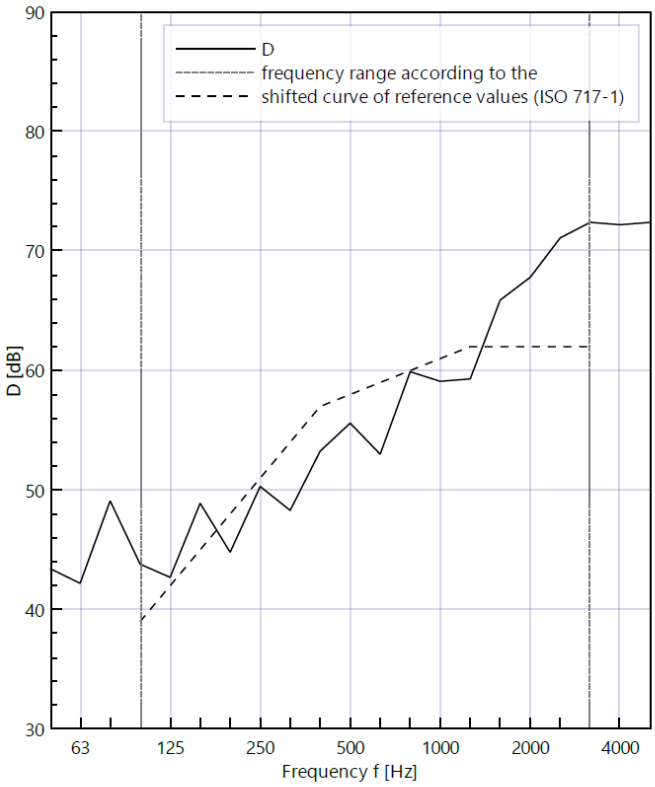
XL2 Sound Level Meter: A2A-04827-D2 (M2230: 1860)

Area of common partition: 40.00 m²

Receiving room volume: 50.00 m³

Frequency f Hz	D 1/3 octave dB
50	43.4
63	42.2
80	49.1
100	43.8
125	42.7
160	48.9
200	44.8
250	50.3
315	48.3
400	53.3
500	≥ 55.6
630	≥ 53.0
800	≥ 59.9
1000	≥ 59.1
1250	≥ 59.3
1600	≥ 65.9
2000	≥ 67.8
2500	≥ 71.1
3150	≥ 72.4
4000	≥ 72.2
5000	≥ 72.4

≥: 1.3 dB correction applied,
value at the limit of measurement



Rating in accordance with ISO 717-1:

$D_w(C;C_{tr})$ = 58 (-1; -4) dB

$C_{50\text{-}3150}$ = -1 dB; $C_{50\text{-}5000}$ = 0 dB; $C_{100\text{-}5000}$ = 0 dB

$C_{tr,50\text{-}3150}$ = -5 dB; $C_{tr,50\text{-}5000}$ = -5 dB; $C_{tr,100\text{-}5000}$ = -4 dB

Evaluation based on field measurement using results obtained by an engineering method.

Report No.: 11067

Name: Braiden Acoustics

Date: 22/07/2022

Signature:

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A2 PLANT NOISE CALCULATION

332 Slade Lane			Duct Calculation	Kitchen Extract	Octave band centre frequency								
Item	Quantity		Description	Details	63	125	250	500	1000	2000	4000	Total level	
1a			Sound Pressure Level @ Xm	SWL data used	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
1b			Sound Power Level of unit	45JM/16/4/5/30 - outlet, Lw	76.0	74.0	70.0	68.0	64.0	63.0	60.0	79.4	
2			PLENUM Insetion Loss	no									
3	3	m	Duct Length in metres	Round > 300	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
4	1		Number of bends	500mm round bend	-1	-1	-2	-3	-3	-3	-3		
5		mm	Branch area	10log(branch mm2/duct mm2)	0	0	0	0	0	0	0		
6			Silencer attenuation (1)	R02 - 4 - 1500 (Mel)	-7	-14	-20	-29	-29	-31	-29		
7			Silencer attenuation (2)	no silencer or n/a	0	0	0	0	0	0	0		
7			Silencer attenuation (2)	no silencer or n/a	0	0	0	0	0	0	0		
8			Att due to end reflection	500 mm end reflection	-8	-4	-1	0	0	0	0		
9			Louvre attenuation	no acoustic louvre or n/a	0	0	0	0	0	0	0		
			A weighting	yes	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0		
10			Sound power at termination		33.8	38.9	38.4	32.8	32.0	30.2	29.0	43.5	
11	Q	1	Directivity**	0 surfaces	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
12	3	m	Distance Attenuation	20*log10(r)	-9.54	-9.54	-9.54	-9.54	-9.54	-9.54	-9.54		
			Air absorption	15°C; 80% humidity	0.00	0.00	0.00	-0.01	-0.01	-0.02	-0.07		
			Numerical correction	SPL = SWL - 20log(r) +DI - 11	-11.00	-11.00	-11.00	-11.00	-11.00	-11.00	-11.00		
	δ	0	Barrier	no	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
			SPL(A) at NSR	$L_{p,NSR}$	**13.3**	**18.4**	**17.9**	**12.3**	**11.4**	**9.6**	**8.4**	**23.0**	**dB**

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