

Popeyes
The Peel Centre
Harborough Hill Road
Barnsley
S71 1BQ

**Plant Noise Impact
Assessment Report**

On behalf of

chapman
ventilation

Project Reference: 91516 | Revision: 00 | Date: 28th April 2023

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Document Information

Project Name : Popeyes, The Peel Centre, Barnsley
Project Reference : 91516
Report Title : Plant Noise Impact Assessment
Doc Reference : 91516/NIA
Date : 28th April 2023

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For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed / Approved

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Executive Summary

Noise Solutions Limited has undertaken a plant noise impact assessment to assess new plant at the proposed Popeyes restaurant on The Peel Centre retail park in Barnsley.

The assessment shows that the plant noise levels at the nearest residential windows will be below 35dB L_{Aeq} during trading hours and below 20dB L_{Aeq} at night, and are therefore not likely to result in an adverse noise impact.

1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation Ltd to undertake a noise assessment for new plant serving a proposed Popeyes restaurant on The Peel Centre in Barnsley.
- 1.2. Cumulative plant noise emissions for the proposed plant have been predicted at the nearest noise-sensitive receptors.
- 1.3. To assist with the understanding of this report a glossary of acoustic terms can be found in [Appendix A](#). An in-depth glossary of acoustic terms can be viewed online at www.acoustic-glossary.co.uk.

2.0 Details of development proposals

- 2.1. The new restaurant is proposed to occupy a detached unit at the north west corner of The Peel Centre, off Harborough Hill Road in Barnsley. The unit was previously occupied by a Pizza Hut restaurant.
- 2.2. New plant will be installed in a well in the roof of the building, and will comprise a kitchen extract fan (EF1), a supply fan (AHU1), a toilet extract fan (EF2), a general extract fan (EF3), three AC units (CU1 – CU3) and two catering condensers (CC1-CC2).
- 2.3. The proposed condenser units, extract and supply systems may operate between 07.00 and 00.00 hours. The ventilation and air conditioning systems will be switched off outside these hours. The catering condensers are assumed to operate throughout a 24-hour period.
- 2.4. The proposed plant layout is shown in [Appendix C](#). Plant noise data is presented in [Appendix D](#).

3.0 Nearest noise-sensitive receptors

- 3.1. The Peel Centre is a retail park adjacent to the A61 Harborough Hill Road.
- 3.2. The nearest residential receptors to the plant will be houses to the north west, on Harborough Hill Road (Receptor R1).
- 3.3. The ground slopes steeply down from the level of the restaurant and the first floor windows of the houses are approximately 3m below the level of the plant deck. All plant is therefore significantly screened from the receptors by the roof of the restaurant building.
- 3.4. An aerial photograph showing the site and surrounding area is provided in [Appendix B](#).

4.0 Plant noise assessment

- 4.1. Cumulative noise emissions from the new proposed plant have been predicted at the nearest residential properties to the site based on the noise output information shown in [Appendix D](#).
- 4.2. Noise levels for the proposed fans have been predicted taking into account ductwork system losses, aperture size, directivity of sound propagation, screening and distance attenuation.
- 4.3. The predictions during operating hours have been based on the proposed plant operating simultaneously at full capacity. It has been assumed that all plant items except the catering condenser will operate only during the hours when the restaurant is open, with the catering condenser operating at all times.
- 4.4. It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive characteristics providing it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems.
- 4.5. Table 1 below, summarises the predicted noise levels at the nearest receptor. Noise levels at all other nearby houses will be lower, due to increased distance from the plant. The full set of calculations is presented in [Appendix E](#).

Table 1 Summary of predicted noise levels at the nearest noise sensitive receptors

Receptor	Period	Predicted sound pressure level at receptor, L_{Aeq} (dB)
Receptor R1	Operating hours (07.00 – 00.00 hours)	32
	Non-operating hours (00.00 – 07.00 hours)	17

- 4.6. For recent applications for plant installations on The Peel Centre¹, Barnsley Metropolitan Borough Council has recognised that background sound levels in the area are high, due to the retail park and traffic on Harbrough Hill Road.
- 4.7. The predicted sound pressure levels at the nearest houses, due to the proposed plant, are below 35dB L_{Aeq} during the daytime and below 20dB L_{Aeq} at night. These would be considered objectively low levels, even in areas not already subject to high levels of traffic noise.
- 4.8. Assuming a modest sound reduction of 10dBA through a partially-opened window, resulting plant sound levels within the nearest house would be below 25dBA during the daytime and below 10dBA at night. These levels are similarly objectively very low and are therefore unlikely to lead to an adverse noise impact, particularly in the context of the existing noise environment.

¹ E.g. Application 2022/0708 for Units 3B and 3C

Uncertainties

- 4.9. Where possible uncertainty in the above assessments has been minimised by the use of a well-established calculation method.

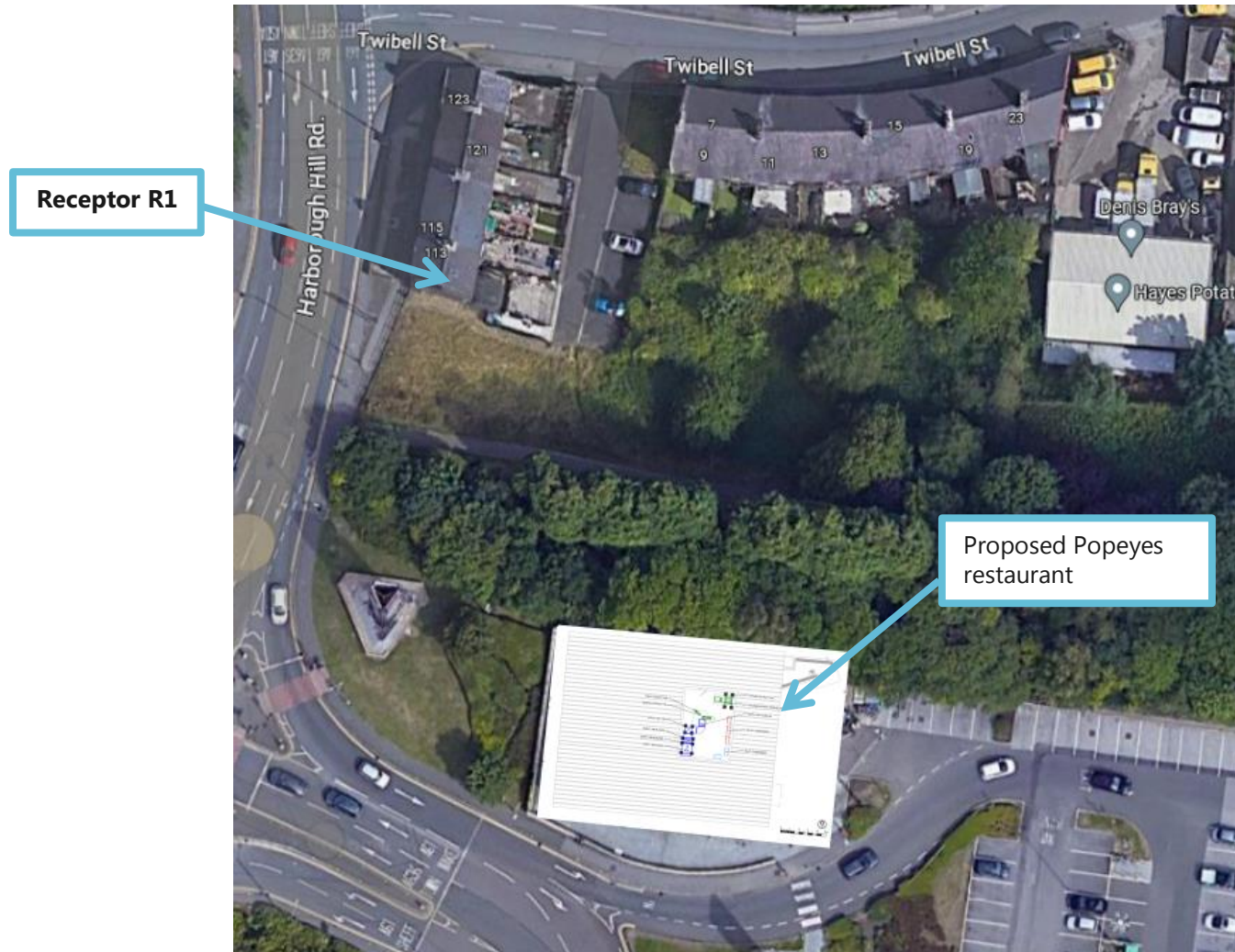
5.0 Summary

- 5.1. Noise Solutions Ltd (NSL) has been commissioned by Chapman Ventilation Ltd to undertake a noise assessment for new plant serving a proposed Popeyes restaurant on The Peel Centre in Barnsley.
- 5.2. The cumulative noise levels due to the proposed plant have been predicted at the most affected noise sensitive receptor. Sound levels are below 35dB L_{Aeq} during the daytime and below 20dB L_{Aeq} at night and it is therefore considered unlikely that there will be an adverse noise impact.

Appendix A Acoustic terminology

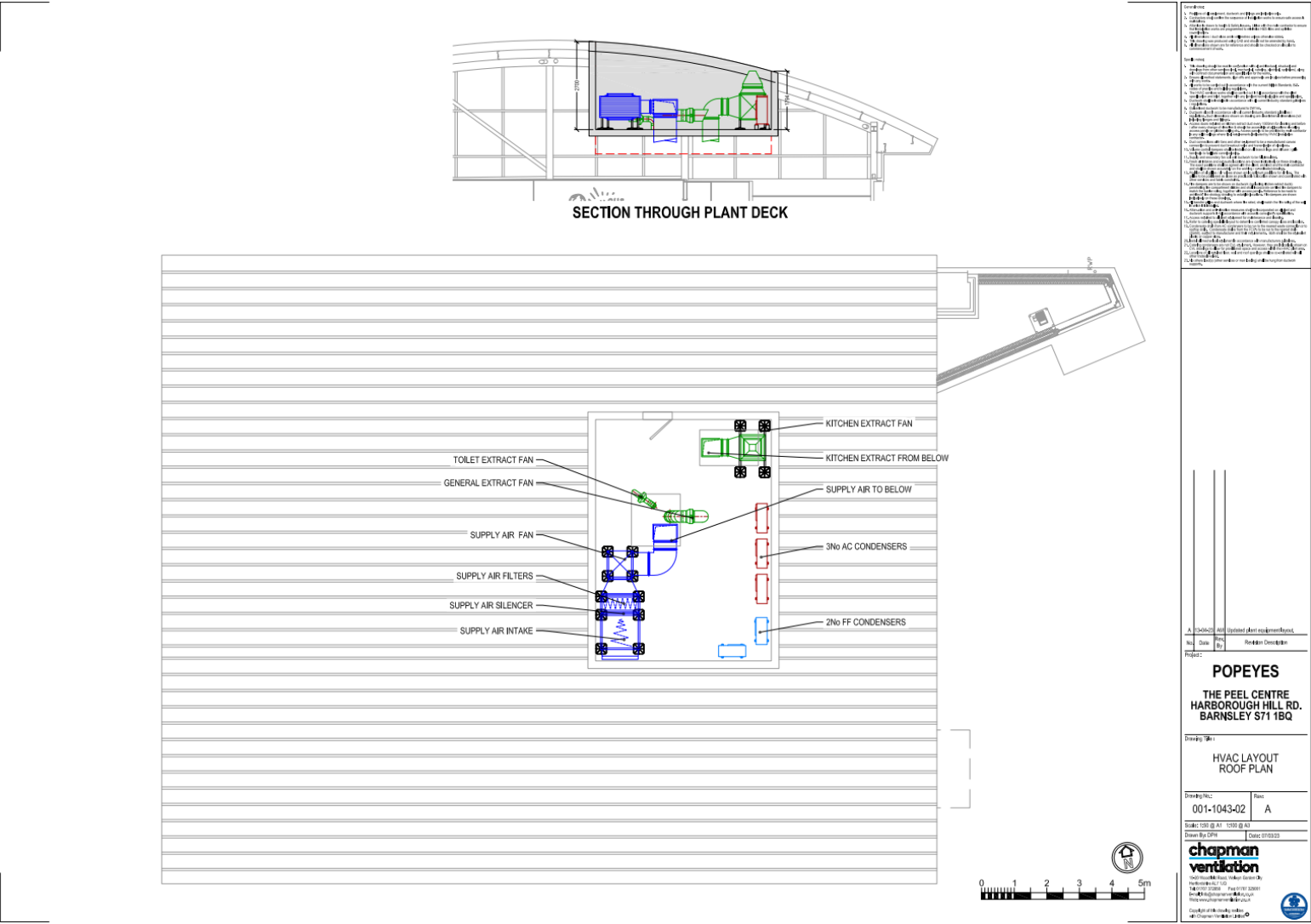
Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10}(s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Photograph of site showing areas of interest



Photograph 1 Courtesy of Google Earth

Appendix C Plant layout drawing



Appendix D Plant information and manufacturer published sound pressure levels

Ref	Make / Model		Sound Power Level. dB @ octave band centre frequency, Hz							
			63	125	250	500	1k	2k	4k	8k
EF1	Systemair MUB/T 062 560 D4 IE3 Multibox	In-duct exhaust	77	91	85	81	79	75	72	66
		Casing	56	74	56	47	47	45	38	30
AHU1	Systemair MUB 062 560 D4 IE3 Multibox	In-duct intake	76	85	81	79	77	74	72	66
		Casing	56	69	54	47	47	45	39	30
EF2	Systemair K200L Sileo	In-duct exhaust	83	78	71	66	62	60	54	51
		Casing	53	42	48	44	45	42	36	30
EF3	Systemair Prio 355EC	In-duct exhaust	84	90	90	84	82	77	70	62
		Casing	36	58	68	67	62	56	54	36

Ref	Make/ Model	Sound Pressure Level
CU1, CU2, CU3	Panasonic / U-140PZ3E5	54dB(A) at 1m (each)
CC1, CC2	Catering Condensers (typical)	35dB(A) at 10m (each)

Appendix E Plant noise calculations

Summary

Plant	Resultant at Receptor (dBA)
	R1
EF1 – Kitchen Extract	26
EF1 – Kitchen Extract Fan (Casing breakout)	13
AHU1 – Supply Intake	27
AHU1 – Supply Fan (Casing breakout)	10
EF2 – Toilet Extract	14
EF2 – Toilet Extract (Casing breakout)	-7
EF3 – General Extract	28
EF3 – General Extract (Casing breakout)	14
CU1	12
CU2	13
CU3	13
CC1	14
CC2	14
Operational Hours (07.00-midnight Hours) – all plant running	32
Non-Operational Hours (midnight-07.00 Hours) – CC1, CC2 only	17



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Project **Popeye's, Barnsley**

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Plant Ref **EF1 exhaust**
Plant Description **Systemair MUB/T 062 560 D4 IE3**

				Sound level (dB) at octave band centre frequencies (Hz)							
				63	125	250	500	1k	2k	4k	8k
Grille Face Area grille dimensions mm											
	600	wide	600	high							
SYSTEM LOSSES				8	3	1	0	0	0	0	0

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct Lw	77	91	85	81	79	75	72	66	84
System losses		-8	-3	-1	0	0	0	0	0	
Atmospheric side attenuator	I.L.	0	0	0	0	0	0	0	0	
Sound power level leaving terminal		69	88	84	81	79	75	72	66	84

Receptor R1	V angle	H angle										
Directivity correction	135	0	600 x 600 (135,0)	-1	-1	-3	-6	-9	-8	-8	-8	
Distance correction	52.5	m	52.5 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening correction	Screened:	52.7	δ= 0.2	-7	-8	-9	-12	-14	-17	-20	-23	
Surface corrections etc												
Resultant at Receptor R1			Lp	19	37	30	21	14	8	2	-7	26



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Plant Ref **EF1 casing**
Plant Description **Systemair MUB/T 062 560 D4 IE3**

		Sound level (dB) at octave band centre frequencies (Hz)										
			63	125	250	500	1k	2k	4k	8k		
Source noise level (unattenuated)			56	74	56	47	47	45	38	30		59
Casing Lagging / Enclosure		I.L.	0	0	0	0	0	0	0	0		
Attenuated source noise level			56	74	56	47	47	45	38	30		59
Receptor R1												
Distance correction	51.9 m	51.9 m	-42	-42	-42	-42	-42	-42	-42	-42		
Screening correction	Screened: 52.2 m	0.3	-7	-9	-11	-13	-16	-19	-22	-25		
Surface corrections etc			6	6	6	6	6	6	6	6		
Resultant at Receptor R1		Lp	13	29	9	-2	-5	-10	-20	-31		13



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Plant Ref **AHU1 intake**
Plant Description **Systemair MUB 062 560 D4 IE3**

				Sound level (dB) at octave band centre frequencies (Hz)							
				63	125	250	500	1k	2k	4k	8k
Grille Face Area grille dimensions mm											
	1200	wide	600	high							
SYSTEM LOSSES				6	2	0	0	0	0	0	0

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct Lw	76	85	81	79	77	74	72	66	82
System losses		-6	-2	0	0	0	0	0	0	
Atmospheric side attenuator	I.L.	0	0	0	0	0	0	0	0	
Sound power level leaving terminal		70	83	81	79	77	74	72	66	82

Receptor R1	V angle	H angle										
Directivity correction	0	120	1200 x 600 (0,120)	0	0	-1	-4	-8	-8	-8	-8	
Distance correction	55.4	m	55.4 m	-43	-43	-43	-43	-43	-43	-43	-43	
Screening correction	Screened:	55.8	δ= 0.4	-8	-9	-12	-14	-17	-20	-23	-26	
Surface corrections etc				6	6	6	6	6	6	6	6	
Resultant at Receptor R1			Lp	25	37	31	24	15	9	4	-5	27



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Plant Ref **AHU1 casing**
Plant Description **Systemair MUB 062 560 D4 IE3**

		Sound level (dB) at octave band centre frequencies (Hz)											
				63	125	250	500	1k	2k	4k	8k		
Source noise level (unattenuated)				56	69	54	47	47	45	39	30		56
Casing Lagging / Enclosure			I.L.	0	0	0	0	0	0	0	0		
Attenuated source noise level				56	69	54	47	47	45	39	30		56
Receptor R1													
Distance correction	52.5	m	52.5 m	-42	-42	-42	-42	-42	-42	-42	-42		
Screening correction	Screened:	52.7	Δ=	0.2	-7	-8	-9	-12	-14	-17	-20	-23	
Surface corrections etc					6	6	6	6	6	6	6		
Resultant at Receptor R1			Lp	13	25	9	-1	-3	-8	-17	-29		10



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Plant Ref **EF2 exhaust**
Plant Description **Systemair K200L**

				Sound level (dB) at octave band centre frequencies (Hz)							
				63	125	250	500	1k	2k	4k	8k
Grille Face Area grille dimensions mm											
	200	wide	200	high							
SYSTEM LOSSES				14	10	5	2	0	0	0	0

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct Lw	83	78	71	66	62	60	54	51	70
System losses		-14	-10	-5	-2	0	0	0	0	
Atmospheric side attenuator	I.L.	0	0	0	0	0	0	0	0	
Sound power level leaving terminal		69	68	66	64	62	60	54	51	67

Receptor R1	V angle	H angle										
Directivity correction	45	0	200 x 200 (45,0)	1	2	2	3	3	4	4	4	
Distance correction	51.5	m	51.5 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening correction	Screened:	52.9	δ= 1.4	-11	-14	-16	-19	-22	-25	-28	-31	
Surface corrections etc				6	6	6	6	6	6	6	6	
Resultant at Receptor R1			Lp	23	20	16	12	7	3	-6	-12	14



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Plant Ref **EF2 casing**
Plant Description **Systemair K200L**

		Sound level (dB) at octave band centre frequencies (Hz)									
		63	125	250	500	1k	2k	4k	8k		
Source noise level (unattenuated)		53	42	48	44	45	42	36	30		49
Casing Lagging / Enclosure		I.L.	0	0	0	0	0	0	0		
Attenuated source noise level		53	42	48	44	45	42	36	30		49
Receptor R1											
Distance correction	51.8 m	51.8 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening correction	Screened: 52.9	1.1	-10	-13	-15	-18	-21	-24	-27	-30	
Surface corrections etc			6	6	6	6	6	6	6	6	
Resultant at Receptor R1		Lp	7	-7	-3	-10	-12	-18	-27	-36	-7



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Plant Ref **EF3 exhaust**
Plant Description **Systemair Prio 355 EC**

				Sound level (dB) at octave band centre frequencies (Hz)							
				63	125	250	500	1k	2k	4k	8k
Grille Face Area grille dimensions mm											
	350	wide	350	high							
SYSTEM LOSSES				11	7	3	1	0	0	0	0

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct Lw	84	90	90	84	82	77	70	62	87
System losses		-11	-7	-3	-1	0	0	0	0	
Atmospheric side attenuator	I.L.	0	0	0	0	0	0	0	0	
Sound power level leaving terminal		73	83	87	83	82	77	70	62	86

Receptor R1	V angle	H angle										
Directivity correction	0	120	350 x 350 (0,120)	-1	-1	-2	-4	-9	-8	-8	-8	
Distance correction	52.8	m	52.8 m	-42	-42	-42	-42	-42	-42	-42	-42	
Screening correction	Screened:	53.9	δ= 1.1	-10	-13	-15	-18	-21	-24	-27	-30	
Surface corrections etc				6	6	6	6	6	6	6	6	
Resultant at Receptor R1			Lp	26	33	34	25	16	9	-1	-12	28



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Plant Ref **EF3 casing**
Plant Description **Systemair Prio 355 EC**

		Sound level (dB) at octave band centre frequencies (Hz)								
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)		36	58	68	67	62	56	54	36	68
Casing Lagging / Enclosure		I.L.	0	0	0	0	0	0	0	
Attenuated source noise level		36	58	68	67	62	56	54	36	68
Receptor R1										
Distance correction	52.7 m	52.7 m	-42	-42	-42	-42	-42	-42	-42	
Screening correction	Screened: 53.6	0.9	-10	-12	-15	-17	-20	-23	-26	-29
Surface corrections etc			6	6	6	6	6	6	6	
Resultant at Receptor R1		Lp	-10	10	17	14	6	-3	-8	-29
										14

Unit	Make / Model	LpA	Distance		dB	Directivity	Screening	Result
			at / m	m				
CU1	Panasonic U-140PZ3	54	1	53.8	-35	6	-13	12
CU2	Panasonic U-140PZ3	54	1	54.7	-35	6	-12	13
CU3	Panasonic U-140PZ3	54	1	55.6	-35	6	-12	13
CC1	Catering Condenser	35	10	56.6	-15	6	-12	14
CC2	Catering Condenser	35	10	56.7	-15	6	-12	14