

Rylands Building Manchester

Rooftop Plant Noise Assessment Report

Client:

Domis Construction Limited
Douglas House, Green Street
Wigan, WN3 4DQ

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**JAMESON
ACOUSTICS**

Consultants in acoustics,
noise and vibration

Document Control

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1.0 Introduction

Jameson Acoustics Limited has been commissioned by Domis Construction Limited to provide a plant noise assessment in relation to the revised rooftop condenser plant strategy for the Rylands Building in Manchester. The proposal relates to replacement of 3nr Level 11 rooftop Chillers for an array of VRF condenser units split across the Level 7 and Level 11 roofs.

NB: Please refer to Appendix A for a description of the acoustic terminology used herein.

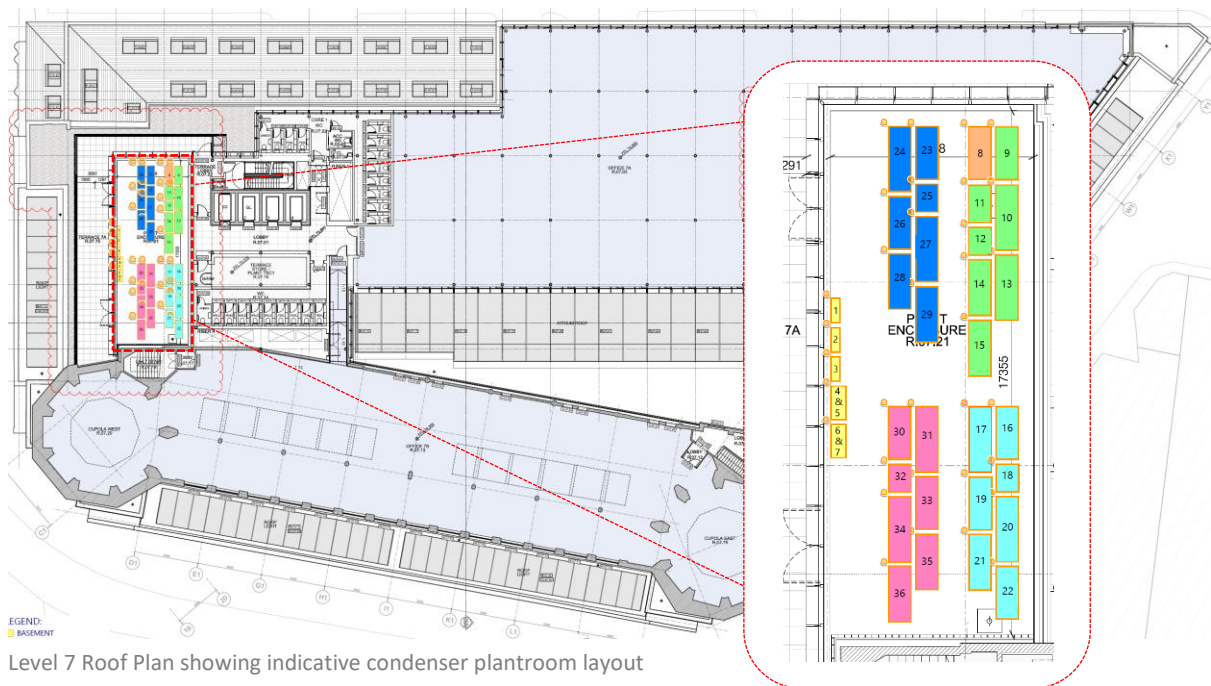
2.0 Plant Proposals

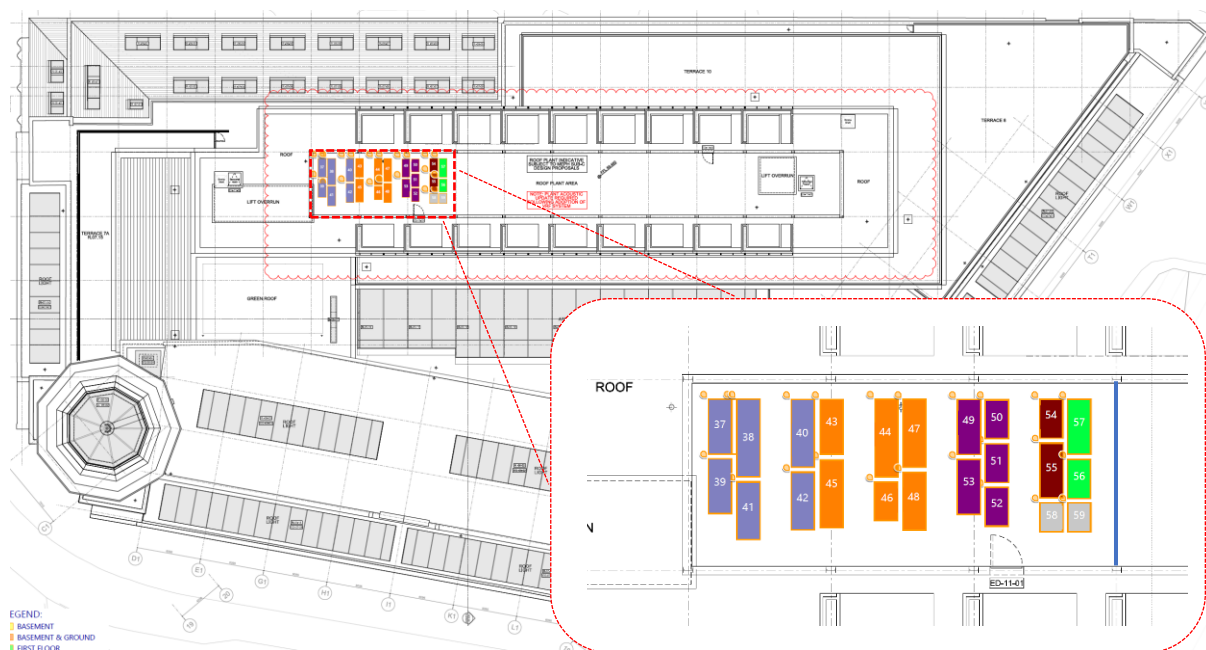
The proposed condenser plant design strategy will see the installation of 36nr VRF condensers on the Level 7 roof terrace (on the corner of High Street and Bridgewater Place) and the installation of 23nr VRF condensers on the Level 11 roof, near to the Bridgewater Place boundary. Note there are no other notable external plant items on the roofs.

All units will be supplied by Mitsubishi, who have provided full source noise data for each unit operating at full (100%) duty to inform our assessment. A unit schedule, with associated model reference and source noise data, is presented in Appendix B.

At each roof level, the condensers will be housed within an enclosure with sufficient free-area (air flow) provisions.

The following Figures show the location and general arrangement of the two condenser plantrooms.





Level 11 Roof Plan showing indicative condenser plantroom layout

Each plantroom will comprise solid walls (with an element of louvred free-area provided to suit the equipment air flow requirements) and a free-area louvred 'lid'.

At Level 7, the plantroom will be formed in part by the outer perimeters of the existing/proposed building massing (on the south and east elevations). The west and north walls will be formed from new cladding designed to match the aesthetics of the new extension; curtain walling with infill ceramic glass panels. The plantroom will be circa 3.3 m in height (measured externally from L07 FFL).

At Level 11, the plant room will be formed from a free standing solid wall cladding system incorporating a proportion of free-area louvre at low level along the two long elevations, concealed behind adjacent sawtooth features of the building. The condenser compound forms a smaller section of the full plantroom provision, and an internal wall will be introduced to section off the condensers from the rest of the plant space. This is indicated by a blue line on the above Figure. The plantroom will be circa 3.3 metres in height (measured externally).

3.0 Plant Noise Emissions Limits

Manchester City Council's requirements for the control of noise is outlined in their Supplementary Planning Document entitled 'Planning & Noise, Technical Guidance' published in October 2022 by their Environmental Protection Team. This document provides guidance to applicants and consultants concerning the assessment and prediction of environmental noise associated with a particular development.

In relation to plant noise emissions, Manchester City Council's guidance advises that *"BS 4142 should be used to assess the likely impact of noise from industrial and commercial sources at noise sensitive premises"*. The

Council consider that new developments should contribute and enhance the area in which they are located and where possible, i.e. prevent 'noise creep', contribute to the improvement of people's health and quality of life as per the NPSE. To achieve this, the Council advises a BS 4142 assessment that demonstrates that:

'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'.

A detailed baseline noise survey of the site was conducted by BWB Consulting with the methodology and results presented in their Noise and Vibration Impact Assessment Report MCP2087 (R2) dated 31 July 2023. Background (L_{A90}) noise levels are presented in this report and used to propose the following plant noise emission limits for the complete development.

Noise Sensitive Receptors	Plant Noise Rating Limit ($L_{Ar,Tr}$)	
	Daytime 0700-2300 ($Tr=1hr$)	Night-time 2300-0700 ($Tr=15min$)
Sasha Hotel	48	45
All other	45	39

Any assessment of external plant noise emissions shall be conducted in accordance with BS 4142. British Standard BS 4142 looks at the assessment of noise of a commercial / industrial nature. It describes methods for rating and assessing outdoor sound of an industrial and/or commercial nature *"on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident"*. In relation to this development, this includes sound from fixed installations, comprising M&E plant and equipment.

The assessment method is based on the difference between the measured 'background sound level' without the influence of any industrial noise source, and the 'rating level' of the industrial source, at the receiver location. The standard states that:

- *a difference of around +10 dB or more is likely to be an indication of a significant adverse impact;*
- *a difference of around +5 dB is of marginal significance is likely to be an indication of an adverse impact;*
- *the lower the rating level is relative to the measured background sound level, the less likely it is that the specific 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".*

Once an initial assessment of the impact has been carried out using the method above, BS 4142 advises that the context of the sound should be considered and, if necessary, the assessment of impact modified accordingly. The evaluation of noise impact is not just determined through the objective numeric assessment, but also with consideration for the site context, e.g. is the receptor already exposed to similar noises, how sensitive is the receptor, how often and for how long does the noise occur. It is therefore entirely possible that whilst the objective outcome of the BS 4142 calculation indicates a risk of adverse noise impact, the context of the proposals may reduce this to an acceptable level. Such cases can be supported by using alternative assessment methods, for example, change in L_{Aeq} noise level.

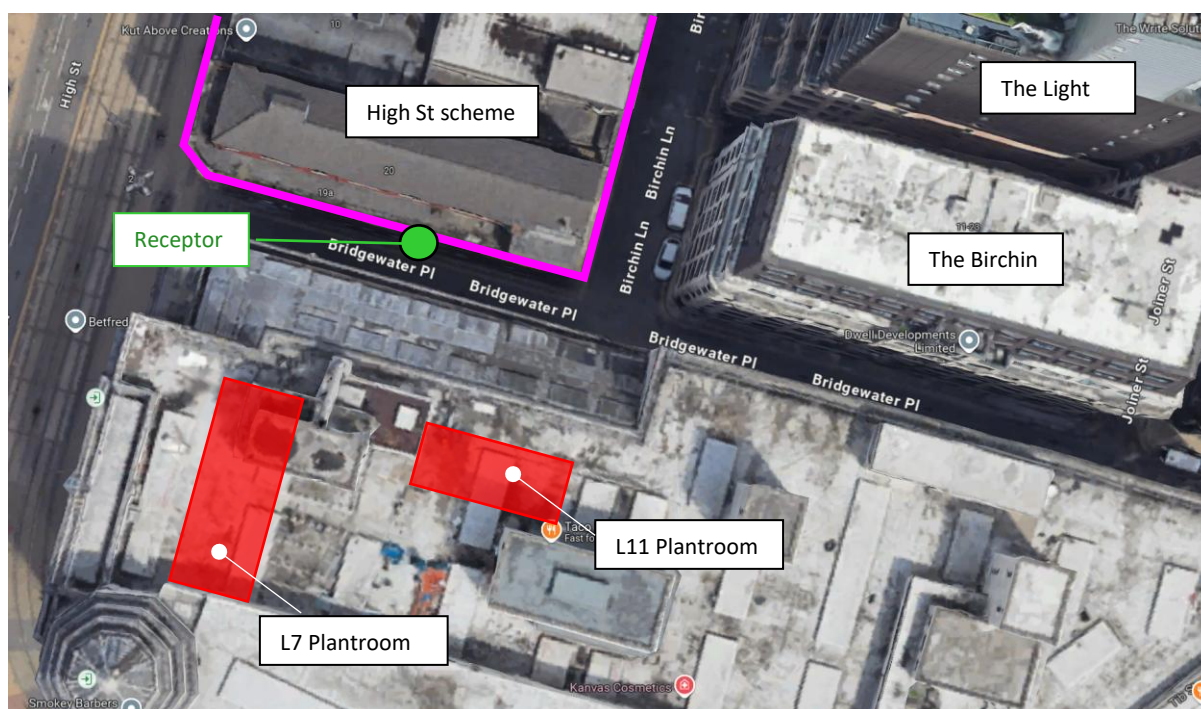
4.0 Nearest Noise Sensitive Receptors

The nearest noise sensitive receptor to the condenser plantrooms will be future residential windows of the adjacent consented scheme to the north, on the corner of Bridgewater Place and High Street (consent reference: 131375/FO/2018). This development shall be referred to as 'High Street scheme' thus forth. The consented scheme proposes a 21-storey residential tower; hence, future (consented) upper-level apartments may look down onto the two plantrooms.

Other notable noise sensitive receptors will be residential windows include the upper floors of The Birchin, to the northeast over Bridgewater Place (Level 8 being the top floor of this development), and The Light residential tower, with sensitive windows overlooking the Level 11 plantroom. However, these two receptors are a greater distance from the consent High Street scheme and thus provided any noise mitigation is applied holistically (i.e. equal noise attenuation attained in all directions), achieving the plant noise limit at the High Street scheme will ensure compliance at all other receptors.

Note, the windows in the proposed development overlooking the Level 7 plantroom will be onto a lobby and not an occupied office floor.

The following Figure illustrates the chosen receptor point for the High Street scheme, which is approximately equidistant from both plantrooms. Our assessment shall consider this receptor point at three heights; (1) low level – equivalent elevation to the Level 7 plantroom, (2) mid-level – a position that is half way between the Level 7 and Level 11 plantrooms, and (3) high level – a position that is circa 3-4 floors above the Level 11 plantroom.



Plan showing noise sensitive receptors (© maps.google.co.uk)

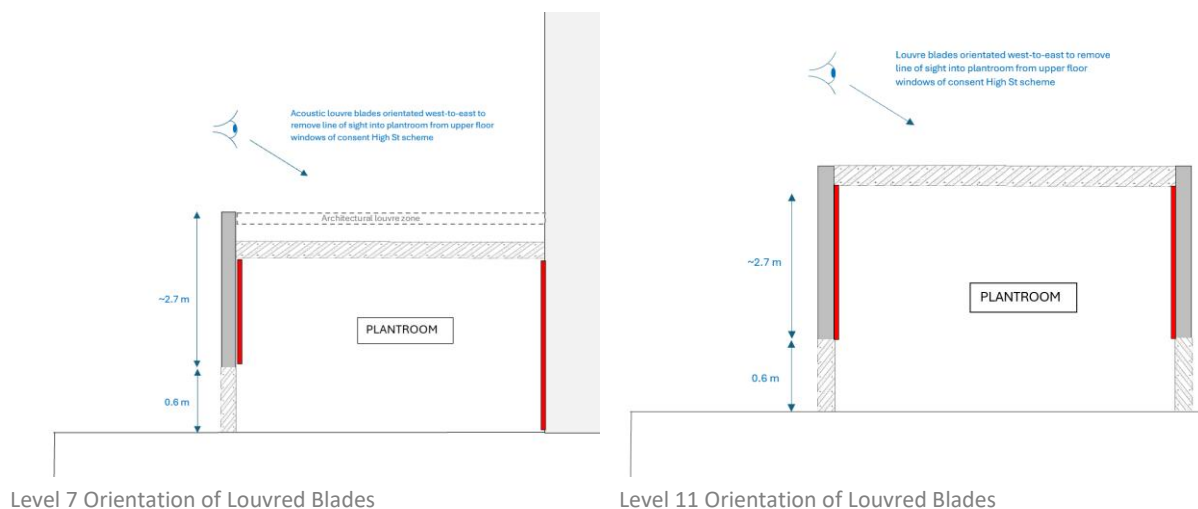
5.0 Noise Mitigation Solution

The proposal to control noise emissions is to ensure the plantroom enclosures provide sufficient attenuation of noise close to the source. This will be achieved by use of acoustically-lined louvres for the air inlets (in the walls) and air outlets (the ‘lids’). In addition, a minimum sound reduction specification will be provided for the solid elements of the walls and both plantrooms will be fully lined with sound absorbent material to alleviate reverberant noise build-up.

The complete noise mitigation solution shall provide:

- 1. Units 8-59 will be programmed with a restricted night-time mode operation between the hours of 23:00-07:00hr.
- 2. Minimum 300mm deep acoustic louvres to the air inlet (wall) and outlet (lid) providing the minimum insertion loss values tabulated below.
- 3. The louvres in the walls shall occupy not more than 33% of the overall surface area on any plantroom elevation.
- 4. The vertically orientated louvres shall be orientated in the traditional form, with downward facing blades (i.e. so that no direct visual path is provided into the plantroom when looking downwards towards the external wall, as illustrated below).
- 5. The horizontally orientated ‘lid’ louvres shall be orientated so that blade profiles run west-to-east with a south-throwing arrangement (i.e. so that there is no direct line of sight into the plantroom from the north receptor, as illustrated below). Additional architectural louvres to be located above the acoustic louvre at Level 07 for visual screening.
- 6. The solid walls shall include a layer that provides a minimum mass per unit area of 12.0 kg/m², or be constructed from a cladding system that achieves the minimum sound reduction indices tabulated below.
- 7. All available solid vertical wall surfaces of the plantrooms shall be fully lined (to the full area) with a minimum 100 mm deep sound absorbent lining achieving the minimum sound absorption coefficients tabulated below.

Element	Min. Sound Reduction / Insertion Loss Performance (dB) at OBCF (Hz)						
	63	125	250	500	1k	2k	4k
300mm deep acoustic louvre, e.g. IAC Slimshield SL300	6	7	10	12	18	18	14
Solid Walls e.g. 1.6 mm steel or most proprietary cladding panels	14	18	22	27	32	37	41



6.0 Calculations

Full calculations sheets are provided in Appendix B. The calculations follow widely recognised/adopted methods for noise propagation; namely, conformal area distance loss for large source divergency and screening. Full octave band calculations have been performed with all units operating at full 100% duty. In reality, this could never happen for a variety of reasons but will provide an absolute worst-case assessment.

Given that the units are enclosed within plantrooms, the calculations consider two sound paths:

- Direct to direct sound propagation, and
- Reverberant to direct sound propagation.

The logarithmic sum of both paths is taken to determine the cumulative plant noise level at the receptors. Note the VRF condensers are inverter driven and will ramp up/down as required to service building heat loads. However, modern VRF condensers operate with smooth ramping duties, and are not expected to generate any notable impulsive or intermittent noises that would attract attention. Furthermore, noise from the steady state operate of the units would be dominated by the discharge fans which, based on the published noise data, are expected to be emit a broadband noise free from tonality. As such, no acoustic feature correction is deemed necessary in accordance with BS 4142.

No contextual argument is deemed necessary in accordance with BS 4142. A definitive criterion has been provided by MCC and the project shall be designed accordingly to satisfy these limits.

In terms of calculation uncertainty, Class 1 sound level meters were used to establish prevailing background noise levels in the area. The background noise measurement positions chosen is deemed to suitably representative of the lowest background noise levels for dwellings onto Bridgewater Place. For the consent High Street scheme, background noise levels are likely to be slightly higher owing to the increased exposure to High Street. The levels may further increase with height up the building, as screening protection from neighbouring buildings dissipates. The baseline survey was carried out over a full 24-hour weekday period,

which ensure the lowest background noise levels are considered in the statistical analysis of daytime and night-time readings. No weekend noise measurements were taken. It is common for Sunday night background noise levels to be lower than weekday. However, this is an office scheme, and the maximum heat loads (building occupancy) would be expected on weekdays only. There is a chance the chosen 24-hour period was influenced by atypical factors, but this is unlikely as the readings are considered to fall within the expected range for a site in this location. Hence, background noise level readings are deemed to be suitably representative (if anything, on the pessimistic side), which would suggest a nominal tolerance.

In terms of the source noise data set and assessment procedure, source noise data has been obtained directly from the supply based on laboratory measurements of the equipment in a controlled environment. Assessment procedures follow industry standard methods, meaning uncertainty in the source data and assessment calculations are also likely to be nominal.

The following tables summarise the results of the assessment to the identified nearest and most exposed noise sensitive receptor (at low, mid and high level) and evaluates the level against the limits.

Daytime 07:00-23:00

Receptor (Hight St scheme)	Specific Noise Level, L_{Aeq}	Acoustic Feature	Rating Level, $L_{Ar,Tr}$	Criterion, $L_{Ar,Tr}$	Compliance?
Low level	43 dB	0 dB	43 dB	45 dB	✓
Mid level	45 dB	0 dB	45 dB	45 dB	✓
High level	45 dB	0 dB	45 dB	45 dB	✓

Night-time 23:00-07:00

Receptor (Hight St scheme)	Specific Noise Level, L_{Aeq}	Acoustic Feature	Rating Level, $L_{Ar,Tr}$	Criterion, $L_{Ar,Tr}$	Compliance?
Low level	31 dB	0 dB	31 dB	39 dB	✓
Mid level	33 dB	0 dB	33 dB	39 dB	✓
High level	33 dB	0 dB	33 dB	39 dB	✓

The results demonstrate that, with the noise mitigation solutions implemented in full accordance with Section 5.0, plant noise emissions should comply with the plant noise rating limits, and therefore the requirements of Manchester City Council.

7.0 Conclusions

Jameson Acoustics Limited has been commissioned by Domis Construction Limited to provide a plant noise assessment in relation to the revised rooftop condenser plant strategy for the Rylands Building in Manchester.

The assessment finds that plant noise emission levels are expected to comply with Manchester City Council's plant noise emission requirements with noise mitigation solutions implemented in full accordance with the measures detailed in Section 5.0 of this report.

Appendix A – Acoustic Terminology

dB	Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted (e.g. $L_{Aeq,T}$ in dB). Noise levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is only just perceptible.
$L_{Aeq,T}$	$L_{Aeq,T}$ is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time measurement period, T .
$L_{10,T}$	L_{10} is the noise level exceeded for 10% of the measurement period T (i.e. the quietest 10% of the measurement) and has, for many years, been used in the assessment of road traffic noise.
$L_{90,T}$	L_{90} is the noise level exceeded for 90% of the measurement period T (i.e. the quietest 10% of the measurement) and is often used to describe the 'background' noise level.
L_{max}	L_{max} is the maximum sound pressure level recorded over the measurement period, T . L_{max} is often used in assessing scheduled environmental noise 'events' (such as train passbys), particularly at night where such events may cause sleep disturbance.
R_w	The weighted sound reduction index, R_w , is a single figure description of sound reduction as defined in BS EN ISO 717-1. It is single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The R_w is calculated from sound insulation measurements taken in an acoustic laboratory. Sound insulation ratings derived from site measurements are invariably lower than the laboratory figures and are referred to as the apparent weighted sound reduction index, R'_w .
$D_{n,e,w}$	The weighted element-normalised level difference, $D_{n,e,w}$, is a single figure description of the sound insulation performance of small building elements, such as a trickle ventilator.
C_{tr}	C_{tr} is correction term applied against the sound insulation single-number values (e.g. R_w) to provide a weighting against low frequency performance. The reference values used within the C_{tr} calculation are based on urban traffic noise.

Appendix B – Calculation Sheets

Plant Schedule & Noise Data (Sound Pressure Levels at 1m)

Ref	Model	No	Location	Standard				Low Noise Mode										Notes	Measurement Unit size						
				63	125	250	500	1k	2k	4k	8k	63	125	250	500	1k	2k	4k	8k	W	D	H	Lp>Lw		
1	PUZ-ZM50VKA2 (599302-UK)	1	7	58	51	45	44	40	37	32	31	58	51	45	44	40	37	32	31	< no low noise mode	1	0.8	0.3	0.63	13.6
2	PUZ-ZM35VKA2 (599231-UK)	1	7	58	51	45	44	40	37	32	31	58	51	45	44	40	37	32	31	< no low noise mode	1	0.8	0.3	0.63	13.6
3	PUZ-ZM50VKA2 (599302-UK)	1	7	58	51	45	44	40	37	32	31	58	51	45	44	40	37	32	31	< no low noise mode	1	0.8	0.3	0.63	13.6
4	PUZ-ZM100YDA.TH (698831-UK)	1	7	58	51	47	46	42	40	35	33	58	51	47	46	42	40	35	33	< 48dBA at 1m / 63dBA LW (assumed spectrum)	1	1.1	0.46	0.87	14.5
5	PUZ-ZM100YDA.TH (698831-UK)	1	7	58	51	47	46	42	40	35	33	58	51	47	46	42	40	35	33	< 48dBA at 1m / 63dBA LW (assumed spectrum)	1	1.1	0.46	0.87	14.5
6	PUZ-ZM100YDA.TH (698831-UK)	1	7	58	51	47	46	42	40	35	33	58	51	47	46	42	40	35	33	< 48dBA at 1m / 63dBA LW (assumed spectrum)	1	1.1	0.46	0.87	14.5
7	PUZ-ZM100YDA.TH (698831-UK)	1	7	58	51	47	46	42	40	35	33	58	51	47	46	42	40	35	33	< 48dBA at 1m / 63dBA LW (assumed spectrum)	1	1.1	0.46	0.87	14.5
8	PURY-P500YNW-A2 (622111-UK)	1	7	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
9	PURY-P500YNW-A2 (622111-UK)	1	7	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
10	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
11	PURY-P450YNW-A2 (622110-UK)	1	7	73	64	66	64	59	55	49	45	64	57	52	49	47	44	39	43		1	1.24	0.74	1.86	16.3
12	PURY-P300YNW-A2 (622107-UK)	1	7	75	62	62	60	54	49	44	40	54	53	47	46	40	35	33	33		1	0.92	0.74	1.86	16.1
13	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
14	PURY-P600YSNW-A2 (624651-UK)	1	7	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
15	PURY-P600YSNW-A2 (624651-UK)	1	7	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
16	PURY-P550YNW-A2 (622112-UK)	1	7	79	66	65	63	56	52	51	45	57	56	49	48	41	37	40	40		1	1.75	0.74	1.86	16.8
17	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
18	PURY-P300YNW-A2 (622107-UK)	1	7	75	62	62	60	54	49	44	40	54	53	47	46	40	35	33	33		1	0.92	0.74	1.86	16.1
19	PURY-P500YNW-A2 (622111-UK)	1	7	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
20	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
21	PURY-P600YSNW-A2 (624651-UK)	1	7	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
22	PURY-P550YNW-A2 (622112-UK)	1	7	79	66	65	63	56	52	51	45	57	56	49	48	41	37	40	40		1	1.75	0.74	1.86	16.8
23	PURY-P500YNW-A2 (622111-UK)	1	7	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
24	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
25	PURY-P300YNW-A2 (622107-UK)	1	7	75	62	62	60	54	49	44	40	54	53	47	46	40	35	33	33		1	0.92	0.74	1.86	16.1
26	PURY-P500YNW-A2 (622111-UK)	1	7	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
27	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
28	PURY-P600YSNW-A2 (624651-UK)	1	7	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
29	PURY-P600YSNW-A2 (624651-UK)	1	7	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
30	PURY-P500YNW-A2 (622111-UK)	1	7	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
31	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
32	PURY-P300YNW-A2 (622107-UK)	1	7	75	62	62	60	54	49	44	40	54	53	47	46	40	35	33	33		1	0.92	0.74	1.86	16.1
33	PURY-P500YNW-A2 (622111-UK)	1	7	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
34	PURY-P650YSNW-A2 (624652-UK)	1	7	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
35	PURY-P600YSNW-A2 (624651-UK)	1	7	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
36	PURY-P600YSNW-A2 (624651-UK)	1	7	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
37	PURY-P500YNW-A2 (622111-UK)	1	11	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
38	PURY-P750YSNW-A2 (624654-UK)	1	11	75	66	68	66	61	56	50	46	64	59	53	50	48	44	40	44		1	1.84	0.74	1.86	16.8
39	PURY-P550YNW-A2 (622112-UK)	1	11	79	66	65	63	56	52	51	45	57	56	49	48	41	37	40	40		1	1.75	0.74	1.86	16.8
40	PURY-P650YSNW-A2 (624652-UK)	1	11	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
41	PURY-P600YSNW-A2 (624651-UK)	1	11	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
42	PURY-P600YSNW-A2 (624651-UK)	1	11	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
43	PURY-P500YNW-A2 (622111-UK)	1	11	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
44	PURY-P750YSNW-A2 (624654-UK)	1	11	75	66	68	66	61	56	50	46	64	59	53	50	48	44	40	44		1	2.44	0.74	1.86	17.3
45	PURY-P650YSNW-A2 (624652-UK)	1	11	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
46	PURY-P400YNW-A2 (622109-UK)	1	11	74	64	66	64	59	55	49	45	64	57	51	48	47	43	38	44		1	1.24	0.74	1.86	16.3
47	PURY-P650YSNW-A2 (624652-UK)	1	11	77	66	66	64	58	54	48	43	58	57	52	49	44	39	37	37		1	1.84	0.74	1.86	16.8
48	PURY-P600YSNW-A2 (624651-UK)	1	11	79	65	66	63	57	52	47	43	57	56	50	49	43	38	36	36		1	1.84	0.74	1.86	16.8
49	PURY-P500YNW-A2 (622111-UK)	1	11	77	67	66	61	55	53	50	44	67	60	56	47	45	42	39	34		1	1.75	0.74	1.86	16.8
50	PURY-P450YNW-A2 (622110-UK)	1	11	73	64	66	64	59	55	49	45	64	57	52	49	47	44	39	43		1	1.24	0.74	1.86	16.3
51	PURY-P450YNW-A2 (622110-UK)	1	11	73	64	66	64	59	55	49	45	64	57	52	49	47	44	39	43		1	1.24	0.74	1.86	16.3
52	PURY-P400YNW-A2 (622109-UK)	1	11	74	64	66	64	59	55	49	45	64	57	51	48	47	43	38	44		1	1.24	0.74	1.86	16.3
53	PURY-P500YNW-A2 (622111-UK)	1	11	77	68	66	61	56	54	51	44	68	60	57	48	46	43	40	34		1	1.75	0.74	1.86	16.8
54	PURY-P400YNW-A2 (622109-UK)	1	11	74	64	66	64	59	55	49	45	64	57	51	48	47	43	38	44		1	1.24	0.74	1.86	16.3
55	PURY-P500YNW-A2 (622111-UK)	1	11	77	68	66	61	56	54	51	44	68	60	57	48	46	43	40	34		1	1.75	0.74	1.86	16.8
56	PURY-P400YNW-A2 (622109-UK)	1	11	74	64	66	64	59	55	49	45	64	57	51	48	47	43	38	44		1	1.24	0.74	1.86	16.3
57	PURY-P500YNW-A2 (622111-UK)	1	11	77	68	66	61	56	54	51	44	68	60	57	48	46	43	40	34		1	1.75	0.74	1.86	16.8
58	PURY-P250YNW-A2 (622106-UK)	1	11	78	62	61	59	52	48	48	43	53	51	41											

Distances (and Distance Loss Corrections - Conformal Area)

Ref	Model	Sce dist (m)			Unit size			NSR - High St (lower)				NSR - High St (mid)				NSR - High St (upper)				Distances (m)				Correction (Lp at 1m > Lp at Receptor)			
		No	Location		W	D	H	Lp>Lw	Y-axis	X-axis	Z-axis	Y-axis	X-axis	Z-axis	Y-axis	X-axis	Z-axis	Y-axis	X-axis	Z-axis	1 - High St (lowR - High St (m) - High St (up)1 - High St (lowR - High St (m) - High St (up	2 - High St (lowR - High St (m) - High St (up)2 - High St (lowR - High St (m) - High St (up	3 - High St (lowR - High St (m) - High St (up)3 - High St (lowR - High St (m) - High St (up	4 - High St (lowR - High St (m) - High St (up)4 - High St (lowR - High St (m) - High St (up	5 - High St (lowR - High St (m) - High St (up)5 - High St (lowR - High St (m) - High St (up	6 - High St (lowR - High St (m) - High St (up)6 - High St (lowR - High St (m) - High St (up	7 - High St (lowR - High St (m) - High St (up)7 - High St (lowR - High St (m) - High St (up
1	PUZ-ZM50VKA2 (599302-UK)	1	7	1	0.8	0.3	0.63	13.6	25	10	0	25	10	13.5	25	10	27	26.9	30.1	38.1	25.9	26.9	28.9				
2	PUZ-ZM35VKA2 (599231-UK)	1	7	1	0.8	0.3	0.63	13.6	26	10	0	26	10	13.5	26	10	27	27.9	31	38.8	26.2	27.1	29.1				
3	PUZ-ZM50VKA2 (599302-UK)	1	7	1	0.8	0.3	0.63	13.6	27	10	0	27	10	13.5	27	10	27	28.8	31.8	39.5	26.5	27.3	29.2				
4	PUZ-ZM100YDA.TH (698831-UK)	1	7	1	1.1	0.46	0.87	14.5	28	10	0	28	10	13.5	28	10	27	29.7	32.7	40.2	25.9	26.7	28.5				
5	PUZ-ZM100YDA.TH (698831-UK)	1	7	1	1.1	0.46	0.87	14.5	28	10	0	28	10	13.5	28	10	27	29.7	32.7	40.2	25.9	26.7	28.5				
6	PUZ-ZM100YDA.TH (698831-UK)	1	7	1	1.1	0.46	0.87	14.5	29	10	0	29	10	13.5	29	10	27	30.7	33.5	40.9	26.2	26.9	28.6				
7	PUZ-ZM100YDA.TH (698831-UK)	1	7	1	1.1	0.46	0.87	14.5	29	10	0	29	10	13.5	29	10	27	30.7	33.5	40.9	26.2	26.9	28.6				
8	PURY-P500YNW-A2 (622111-UK)	1	7	1	1.75	0.74	1.86	16.8	20	10	0	20	10	13.5	20	10	27	22.4	26.1	35.1	21.4	22.7	25.1				
9	PURY-P500YNW-A2 (622111-UK)	1	7	1	1.75	0.74	1.86	16.8	20	10	0	20	10	13.5	20	10	27	22.4	26.1	35.1	21.4	22.7	25.1				
10	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	22	10	0	22	10	13.5	22	10	27	24.2	27.7	36.2	22	23.2	25.4				
11	PURY-P450YNW-A2 (622110-UK)	1	7	1	1.24	0.74	1.86	16.3	21.5	10	0	21.5	10	13.5	21.5	10	27	23.7	27.3	35.9	22.3	23.5	25.8				
12	PURY-P300YNW-A2 (622107-UK)	1	7	1	0.92	0.74	1.86	16.1	22.5	10	0	22.5	10	13.5	22.5	10	27	24.6	28.1	36.5	22.8	23.9	26.1				
13	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	24	10	0	24	10	13.5	24	10	27	26	29.3	37.5	22.6	23.6	25.7				
14	PURY-P600YSNW-A2 (624651-UK)	1	7	1	1.84	0.74	1.86	16.8	24	10	0	24	10	13.5	24	10	27	26	29.3	37.5	22.6	23.6	25.7				
15	PURY-P600YSNW-A2 (624651-UK)	1	7	1	1.84	0.74	1.86	16.8	27	10	0	27	10	13.5	27	10	27	28.8	31.8	39.5	23.5	24.3	26.2				
16	PURY-P550YNW-A2 (622112-UK)	1	7	1	1.75	0.74	1.86	16.8	28	10	0	28	10	13.5	28	10	27	29.7	32.7	40.2	23.7	24.6	26.3				
17	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	28	10	0	28	10	13.5	28	10	27	29.7	32.7	40.2	23.7	24.6	26.3				
18	PURY-P300YNW-A2 (622107-UK)	1	7	1	0.92	0.74	1.86	16.1	30	10	0	30	10	13.5	30	10	27	31.6	34.4	41.6	24.9	25.6	27.3				
19	PURY-P500YNW-A2 (622111-UK)	1	7	1	1.75	0.74	1.86	16.8	32	10	0	32	10	13.5	32	10	27	33.5	36.1	43	24.8	25.4	26.9				
20	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	33	10	0	33	10	13.5	33	10	27	34.5	37	43.8	25	25.6	27				
21	PURY-P600YSNW-A2 (624651-UK)	1	7	1	1.84	0.74	1.86	16.8	34	10	0	34	10	13.5	34	10	27	35.4	37.9	44.6	25.2	25.8	27.2				
22	PURY-P550YNW-A2 (622112-UK)	1	7	1	1.75	0.74	1.86	16.8	35	10	0	35	10	13.5	35	10	27	36.4	38.8	45.3	25.5	26	27.3				
23	PURY-P500YNW-A2 (622111-UK)	1	7	1	1.75	0.74	1.86	16.8	20	10	0	20	10	13.5	20	10	27	22.4	26.1	35.1	21.4	22.7	25.1				
24	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	20	10	0	20	10	13.5	20	10	27	22.4	26.1	35.1	21.4	22.7	25.2				
25	PURY-P300YNW-A2 (622107-UK)	1	7	1	0.92	0.74	1.86	16.1	21.5	10	0	21.5	10	13.5	21.5	10	27	23.7	27.3	35.9	22.5	23.7	26				
26	PURY-P500YNW-A2 (622111-UK)	1	7	1	1.75	0.74	1.86	16.8	22	10	0	22	10	13.5	22	10	27	24.2	27.7	36.2	22	23.2	25.4				
27	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	23	10	0	23	10	13.5	23	10	27	25.1	28.5	36.9	22.3	23.4	25.6				
28	PURY-P600YSNW-A2 (624651-UK)	1	7	1	1.84	0.74	1.86	16.8	24	10	0	24	10	13.5	24	10	27	26	29.3	37.5	22.6	23.6	25.7				
29	PURY-P600YSNW-A2 (624651-UK)	1	7	1	1.84	0.74	1.86	16.8	25.5	10	0	25.5	10	13.5	25.5	10	27	27.4	30.5	38.5	23.1	24	25.9				
30	PURY-P500YNW-A2 (622111-UK)	1	7	1	1.75	0.74	1.86	16.8	28	10	0	28	10	13.5	28	10	27	29.7	32.7	40.2	23.7	24.6	26.3				
31	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	28	10	0	28	10	13.5	28	10	27	29.7	32.7	40.2	23.7	24.6	26.3				
32	PURY-P300YNW-A2 (622107-UK)	1	7	1	0.92	0.74	1.86	16.1	30	10	0	30	10	13.5	30	10	27	31.6	34.4	41.6	24.9	25.6	27.3				
33	PURY-P500YNW-A2 (622111-UK)	1	7	1	1.75	0.74	1.86	16.8	32	10	0	32	10	13.5	32	10	27	33.5	36.1	43	24.8	25.4	26.9				
34	PURY-P650YSNW-A2 (624652-UK)	1	7	1	1.84	0.74	1.86	16.8	33	10	0	33	10	13.5	33	10	27	34.5	37	43.8	25	25.6	27				
35	PURY-P600YSNW-A2 (624651-UK)	1	7	1	1.84	0.74	1.86	16.8	34	10	0	34	10	13.5	34	10	27	35.4	37.9	44.6	25.2	25.8	27.2				
36	PURY-P600YSNW-A2 (624651-UK)	1	7	1	1.84	0.74	1.86	16.8	35	10	0	35	10	13.5	35	10	27	36.4	38.8	45.3	25.5	26	27.3				
37	PURY-P500YNW-A2 (622111-UK)	1	11	1	1.75	0.74	1.86	16.8	20	7	13.5	20	7	0	20	7	13.5	25.1	21.2	25.1	22.3	20.9	22.3				
38	PURY-P750YSNW-A2 (624654-UK)	1	11	1	1.84	0.74	1.86	16.8	20.5	7	13.5	20.5	7	0	20.5	7	13.5	25.5	21.7	25.5	22.5	21.1	22.5				
39	PURY-P550YNW-A2 (622112-UK)	1	11	1	1.75	0.74	1.86	16.8	22	7	13.5	22	7	0	22	7	13.5	26.7	23.1	26.7	22.9	21.6	22.9				
40	PURY-P650YSNW-A2 (624652-UK)	1	11	1	1.84	0.74	1.86	16.8	20	10	13.5	20	10	0	20	10	13.5	26.1	22.4	26.1	22.7	21.4	22.7				
41	PURY-P600YSNW-A2 (624651-UK)	1	11	1	1.84	0.74	1.86	16.8	22	7	13.5	22	7	0	22	7	13.5	26.7	23.1	26.7	22.9	21.6	22.9				
42	PURY-P600YSNW-A2 (624651-UK)	1	11	1	1.84	0.74	1.86	16.8	22	10	13.5	22	10	0	22	10	13.5	27.7	24.2	27.7	23.2	22	23.2				
43	PURY-P500YNW-A2 (622111-UK)	1	11	1	1.75	0.74	1.86	16.8	20	10	13.5	20	10	0	20	10	13.5	26.1	22.4	26.1	22.7	21.4	22.7				
44	PURY-P750YSNW-A2 (624654-UK)	1	11	1	2.44	0.74	1.86	17.3	20	12.5	13.5	20	12.5	0	20	12.5	13.5	27.2	23.6	27.2	22.5	21.4	22.5				
45	PURY-P650YSNW-A2 (624652-UK)	1	11	1	1.84	0.74	1.86	16.8	21.5	10	13.5	21.5	10	0	21.5	10	13.5	27.3	23.7	27.3	23	21.9	23				
46	PURY-P400YNW-A2 (622109-UK)	1	11	1	1.24	0.74	1.86	16.3	22	12.5	13.5	22	12.5	0	22	12.5	13.5	28.7	25.3	28.7	23.9	22.9	23.9				
47	PURY-P650YSNW-A2 (624652-UK)	1	11	1	1.84	0.74	1.86	16.8	20.5	12.5	13.5	20.5	12.5	0	20.5	12.5	13.5	27.5	24	27.5	23.1	22	23.1				
48	PURY-P600YSNW-A2 (624651-UK)	1	11	1	1.84	0.74	1.86	16.8	22	12.5	13.5	22	12.5	0	22	12.5	13.5	28.7	25.3	28.7	23.5	22.4	23.5				
49	PURY-P500YNW-A2 (622111-UK)	1	11	1	1.75	0.74	1.86	16.8	20	15	13.5	20	15	0	20	15	13.5	28.4	25	28.4	23.4	22.3	23.4				
50	PURY-P450YNW-A2 (622110-UK)	1	11	1	1.24	0.74	1.86	16.3	20	15	13.5	20	15	0	20	15	13.5	28.4	25	28.4	23.8	22.8	23.8				
51	PURY-P450YNW-A2 (622110-UK)	1	11	1	1.24	0.74	1.86	16.3	21	15	13.5	21	15	0	21	15	13.5	29.1	25.8	29.1	24	23	24				
52	PURY-P400YNW-A2 (622109-UK)	1	11	1	1.24	0.74	1.86	16.3	22	15	13.5	22	15	0	22	15	13.5	29.									

Screening Loss - Level 7

Low		Area		63	125	250	500	1k	2k	4k	8k
Solid panel (1.6mm steel)	12		14	18	22	27	32	37	41	45	
300mm louvre (IAC slimshield)	6		6	7	10	12	18	18	14	13	
Composite - wall			10	11	14	17	22	23	19	18	
Screening over lid - near			6	7	9	11	14	16	19	20	
Screening over lid - mid			6	6	7	9	11	14	16	19	
Screening over lid - far			5.5	6	7	8	10	12	15	18	
300mm louvre (IAC slimshield)			6	7	10	12	18	18	14	13	
Composite - flanking over top - near			12	14	19	23	32	34	33	33	
Composite - flanking over top - mid			12	13	17	21	29	32	30	32	
Composite - flanking over top - far			11.5	13	17	20	28	30	29	31	
Composite wall & lid - near			8	9	13	16	22	23	19	18	
Composite wall & lid - mid			8	9	12	16	21	22	19	18	
Composite wall & lid - far			8	9	12	15	21	22	19	18	

Mid-High

		Area		63	125	250	500	1k	2k	4k	8k
300mm louvre (IAC slimshield)			6	7	10	12	18	18	14	13	
45deg off-axis directivity (worst-case)			2	2	2	2	2	2	2	2	
Loss through louvre			8	9	12	14	20	20	16	15	

Screening Loss - Level 11

Low		Area		63	125	250	500	1k	2k	4k	8k
Solid panel (1.6mm steel)	36		14	18	22	27	32	37	41	45	
300mm louvre (IAC slimshield)	0		6	7	10	12	18	18	14	13	
Composite - wall			14	18	22	27	32	37	41	45	
Screening over lid - mid			10	12	15	18	20	20	20	20	
300mm louvre (IAC slimshield)			6	7	10	12	18	18	14	13	
Composite - flanking over top - mid			16	19	25	30	38	38	34	33	
Composite wall & lid - mid			12	15	20	25	31	34	33	33	

Mid

		Area		63	125	250	500	1k	2k	4k	8k
Solid panel (1.6mm steel)	36		14	18	22	27	32	37	41	45	
300mm louvre (IAC slimshield)	18		6	7	10	12	18	18	14	13	
Composite - wall			10	11	14	17	22	23	19	18	
Screening over lid - mid			7	8	10	12	14	17	20	20	
300mm louvre (IAC slimshield)			6	7	10	12	18	18	14	13	
Composite - flanking over top - mid			13	15	20	24	32	35	34	33	
Composite wall & lid - mid			8	10	13	16	22	23	19	18	

High

		Area		63	125	250	500	1k	2k	4k	8k
300mm louvre (IAC slimshield)			6	7	10	12	18	18	14	13	
45deg off-axis directivity (worst-case)			2	2	2	2	2	2	2	2	
Loss through louvre			8	9	12	14	20	20	16	15	

Direct to Direct Calculation - Screening Loss (Maewaka)

Ref	Model	No	Location	High St (lower) wall composite SRI								High St (mid-) wall composite SRI								High St (upper) wall composite SRI							
				63	125	250	500	1k	2k	4k	8k	63	125	250	500	1k	2k	4k	8k	63	125	250	500	1k	2k	4k	8k
1	PUZ-ZM50VKA2 (599302-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
2	PUZ-ZM35VKA2 (599231-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
3	PUZ-ZM50VKA2 (599302-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
4	PUZ-ZM100YDA.TH (698831-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
5	PUZ-ZM100YDA.TH (698831-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
6	PUZ-ZM100YDA.TH (698831-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
7	PUZ-ZM100YDA.TH (698831-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
8	PURY-P500YNW-A2 (622111-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
9	PURY-P500YNW-A2 (622111-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
10	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
11	PURY-P450YNW-A2 (622110-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
12	PURY-P300YNW-A2 (622107-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
13	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
14	PURY-P600YSNW-A2 (624651-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
15	PURY-P600YSNW-A2 (624651-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
16	PURY-P550YNW-A2 (622112-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
17	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
18	PURY-P300YNW-A2 (622107-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
19	PURY-P500YNW-A2 (622111-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
20	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
21	PURY-P600YSNW-A2 (624651-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
22	PURY-P550YNW-A2 (622112-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
23	PURY-P500YNW-A2 (622111-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
24	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
25	PURY-P300YNW-A2 (622107-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
26	PURY-P500YNW-A2 (622111-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
27	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	13	16	22	23	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
28	PURY-P600YSNW-A2 (624651-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
29	PURY-P600YSNW-A2 (624651-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
30	PURY-P500YNW-A2 (622111-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
31	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	12	16	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
32	PURY-P300YNW-A2 (622107-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
33	PURY-P500YNW-A2 (622111-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
34	PURY-P650YSNW-A2 (624652-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
35	PURY-P600YSNW-A2 (624651-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
36	PURY-P600YSNW-A2 (624651-UK)	1	7	8	9	12	15	21	22	19	18	8	9	12	14	20	20	16	15	8	9	12	14	20	20	16	15
37	PURY-P500YNW-A2 (622111-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
38	PURY-P750YSNW-A2 (624654-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
39	PURY-P550YNW-A2 (622112-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
40	PURY-P650YSNW-A2 (624652-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
41	PURY-P600YSNW-A2 (624651-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
42	PURY-P600YSNW-A2 (624651-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
43	PURY-P500YNW-A2 (622111-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
44	PURY-P750YSNW-A2 (624654-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
45	PURY-P650YSNW-A2 (624652-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
46	PURY-P400YNW-A2 (622109-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
47	PURY-P650YSNW-A2 (624652-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
48	PURY-P600YSNW-A2 (624651-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
49	PURY-P500YNW-A2 (622111-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
50	PURY-P450YNW-A2 (622110-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
51	PURY-P450YNW-A2 (622110-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
52	PURY-P400YNW-A2 (622109-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
53	PURY-P500YNW-A2 (622111-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
54	PURY-P400YNW-A2 (622109-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
55	PURY-P500YNW-A2 (622111-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
56	PURY-P400YNW-A2 (622109-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
57	PURY-P500YNW-A2 (622111-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12	14	20	20	16	15
58	PURY-P250YNW-A2 (622106-UK)	1	11	12	15	20	25	31	34	33	33	8	10	13	16	22	23	19	18	8	9	12					

Calculation of Reverberation Noise Levels in Plantrooms

$$L_p(\text{rev}) = L_w(\text{source}) + 10\log(4/R)$$

R = room constant

$$R = S \cdot \alpha(\text{mean}) / (1 - \alpha(\text{mean}))$$

Level 7

L	18
W	7
H	3

V	378
S	402

	Area	63	125	250	500	1k	2k	4k	8k
Level 7									
Floor (incl units)	126	0.35	0.25	0.2	0.2	0.2	0.2	0.25	0.35
Lid (aco louv)	126	1	1	1	1	1	1	1	1
Walls (CMS Danskin - 100mm lining)	150	0.5	0.59	0.88	1	1.03	1.12	1.31	1.31
Mean Alpha		0.61	0.61	0.70	0.75	0.76	0.79	0.88	0.91
R		628.0	633.9	958.3	1201.2	1276.1	1549.7	2964.8	4163.1
KREV		-22.0	-22.0	-23.8	-24.8	-25.0	-25.9	-28.7	-30.2
(Lp,rev = Lw,total - KREV)									

Level 11

L	13
W	6
H	3

V	234
S	270

	Area	63	125	250	500	1k	2k	4k	8k
Level 11									
Floor (incl units)	78	0.35	0.25	0.2	0.2	0.2	0.2	0.25	0.35
Lid (aco louv)	78	1	1	1	1	1	1	1	1
Walls (CMS Danskin - 100mm lining)	114	0.5	0.59	0.88	1	1.03	1.12	1.31	1.31
Mean Alpha		0.60	0.61	0.72	0.77	0.78	0.82	0.91	0.94
R		406.9	422.7	688.2	898.3	966.0	1226.3	2877.7	4476.1
KREV		-20.1	-20.2	-22.4	-23.5	-23.8	-24.9	-28.6	-30.5
(Lp,rev = Lw,total - KREV)									

Level 7 - Reverberant Plantroom Noise Egress

	63	125	250	500	1k	2k	4k	8k
Total Lw (cumul. All units)	93.8	88.9	84.1	79.8	75.4	71.5	69.0	68.2
Rev correction	-22.0	-22.0	-23.8	-24.8	-25.0	-25.9	-28.7	-30.2
Lp (rev)	71.8	66.9	60.3	55.0	50.3	45.6	40.3	38.0
Lw on wall	79.1	74.1	67.5	62.3	57.5	52.8	47.6	45.2
Lw on lid	86.8	81.9	75.3	70.0	65.3	60.6	55.3	53.0
SRI wall	10.0	11.0	14.0	17.0	22.0	23.0	19.0	18.0
SRI lid	6.0	7.0	10.0	12.0	18.0	18.0	14.0	13.0
Lw out of wall	69.1	63.1	53.5	45.3	35.5	29.8	28.6	27.2
Lw out of lid	80.8	74.9	65.3	58.0	47.3	42.6	41.3	40.0

*Corrections taken from vent analysis calc - in-house software

Level 7 Lower Level

Wall: 7m x 3m

*Divergence (21m)	-34.0	-34.0	-34.0	-34.0	-34.0	-34.0	-34.0	-34.0
*Directivity (H=30deg,V=0deg)	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lid: 18m x 3m								
*Divergence (29m)	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0
*Directivity (H=30deg,V=100deg)	-10.0	-17.0	-17.0	-17.0	-17.0	-17.0	-17.0	-17.0
Wall Lp at NSR	39.1	34.1	24.5	16.3	6.5	0.8	-0.4	-1.8
Lid Lp at NSR	33.8	20.9	11.3	4.0	-6.7	-11.4	-12.7	-14.0
Total Lp (rev) at NSR	40.2	34.3	24.7	16.5	6.7	1.1	-0.2	-1.5

Level 7 Mid Level

Wall: 7m x 3m

*Divergence (23m)	-35.0	-35.0	-35.0	-35.0	-35.0	-35.0	-35.0	-35.0
*Directivity (H=30deg,V=35deg)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lid: 18m x 3m								
*Divergence (32m)	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0
*Directivity (H=30deg,V=65deg)	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wall Lp at NSR	37.1	32.1	22.5	14.3	4.5	-1.2	-2.4	-3.8
Lid Lp at NSR	43.8	36.9	27.3	20.0	9.3	4.6	3.3	2.0
Total Lp (rev) at NSR	44.7	38.1	28.6	21.1	10.6	5.6	4.4	3.0

Level 7 High Level

Wall: 7m x 3m

*Divergence (32m)	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0
*Directivity (H=30deg,V=56deg)	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
Lid: 18m x 3m								
*Divergence (40m)	-40.0	-40.0	-40.0	-40.0	-40.0	-40.0	-40.0	-40.0
*Directivity (H=30deg,V=47deg)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Wall Lp at NSR	32.1	26.1	17.5	9.3	-0.5	-6.2	-7.4	-8.8
Lid Lp at NSR	43.8	37.9	28.3	21.0	10.3	5.6	4.3	3.0
Total Lp (rev) at NSR	44.1	38.2	28.7	21.3	10.7	5.9	4.6	3.3

Level 11 - Reverberant Plantroom Noise Egress

	63	125	250	500	1k	2k	4k	8k
Total Lw	93.9	87.5	82.9	77.9	75.2	71.5	68.1	70.2
Rev correction	-20.1	-20.2	-22.4	-23.5	-23.8	-24.9	-28.6	-30.5
Lp (rev)	73.8	67.3	60.6	54.4	51.4	46.6	39.5	39.7
Lw on wall	83.7	77.2	70.5	64.3	61.3	56.6	49.4	49.6
Lw on lid	86.7	80.2	73.5	67.3	64.3	59.6	52.5	52.7
SRI wall	10.0	11.0	14.0	17.0	22.0	23.0	19.0	18.0
SRI lid	6.0	7.0	10.0	12.0	18.0	18.0	14.0	13.0
Lw out of wall	73.7	66.2	56.5	47.3	39.3	33.6	30.4	31.6
Lw out of lid	80.7	73.2	63.5	55.3	46.3	41.6	38.5	39.7

*Corrections taken from vent analysis calc - in-house software

Level 11 Lower Level

Wall: 13m x 3m

*Divergence (27m)	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0
*Directivity (H=40deg,V=30deg)	3.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
Lid: 13m x 6m								
*Divergence (30m)	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0
*Directivity (H=40deg,V=127deg)	-22.0	-22.0	-22.0	-22.0	-22.0	-22.0	-22.0	-22.0
Wall Lp at NSR	39.7	32.2	23.5	14.3	6.3	0.6	-2.6	-1.4
Lid Lp at NSR	20.7	13.2	3.5	-4.7	-13.7	-18.4	-21.5	-20.3
Total Lp (rev) at NSR	39.8	32.2	23.5	14.3	6.3	0.6	-2.5	-1.3

Level 11 Mid Level

Wall: 13m x 3m

*Divergence (23m)	-35.0	-35.0	-35.0	-35.0	-35.0	-35.0	-35.0	-35.0
*Directivity (H=40deg,V=0deg)	4.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0
Lid: 13m x 6m								
*Divergence (26m)	-36.0	-36.0	-36.0	-36.0	-36.0	-36.0	-36.0	-36.0
*Directivity (H=40deg,V=100deg)	-13.0	-13.0	-13.0	-13.0	-13.0	-13.0	-13.0	-13.0
Wall Lp at NSR	42.7	35.2	26.5	17.3	9.3	3.6	0.4	1.6
Lid Lp at NSR	31.7	24.2	14.5	6.3	-2.7	-7.4	-10.5	-9.3
Total Lp (rev) at NSR	43.0	35.5	26.8	17.6	9.6	3.9	0.8	2.0

Level 11 High Level

Wall: 13m x 3m

*Divergence (27m)	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0
*Directivity (H=40deg,V=30deg)	3.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0
Lid: 13m x 6m								
*Divergence (30m)	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0	-38.0
*Directivity (H=40deg,V=63deg)	-1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wall Lp at NSR	39.7	32.2	23.5	14.3	6.3	0.6	-2.6	-1.4
Lid Lp at NSR	41.7	35.2	25.5	17.3	8.3	3.6	0.5	1.7
Total Lp (rev) at NSR	43.8	36.9	27.6	19.1	10.4	5.3	2.2	3.4

Cumulative Sound Levels at Receptor (Direct + Reverberant) - DAYTIME

High St (lower) - wall composite SRI												
Ref	Model	No	Location	63	125	250	500	1k	2k	4k	8k	dBA
1	PUZ-ZM50VKA2 (599302-UK)	1	7	24.1	16.1	7.1	2.1	-6.9	-10.9	-12.9	-12.9	5
2	PUZ-ZM35VKA2 (599231-UK)	1	7	23.8	15.8	6.8	1.8	-7.2	-11.2	-13.2	-13.2	5
3	PUZ-ZM50VKA2 (599302-UK)	1	7	23.5	15.5	6.5	1.5	-7.5	-11.5	-13.5	-13.5	5
4	PUZ-ZM100YDA TH (698831-UK)	1	7	24.1	16.1	9.1	4.1	-4.9	-7.9	-9.9	-10.9	7
5	PUZ-ZM100YDA TH (698831-UK)	1	7	24.1	16.1	9.1	4.1	-4.9	-7.9	-9.9	-10.9	7
6	PUZ-ZM100YDA TH (698831-UK)	1	7	23.8	15.8	8.8	3.8	-5.2	-8.2	-10.2	-11.2	6
7	PUZ-ZM100YDA TH (698831-UK)	1	7	23.8	15.8	8.8	3.8	-5.2	-8.2	-10.2	-11.2	6
8	PURY-P500YNW-A2 (622111-UK)	1	7	47.6	36.6	31.6	23.6	11.6	8.6	9.6	4.6	28
9	PURY-P500YNW-A2 (622111-UK)	1	7	47.6	36.6	31.6	23.6	11.6	8.6	9.6	4.6	28
10	PURY-P650YSNW-A2 (624652-UK)	1	7	47	35	31	26	14	9	7	3	28
11	PURY-P450YNW-A2 (622110-UK)	1	7	42.7	32.7	30.7	25.7	14.7	9.7	7.7	4.7	27
12	PURY-P300YNW-A2 (622107-UK)	1	7	44.2	30.2	26.2	21.2	9.2	3.2	2.2	-0.8	24
13	PURY-P650YSNW-A2 (624652-UK)	1	7	46.4	34.4	31.4	25.4	14.4	9.4	6.4	2.4	28
14	PURY-P600YSNW-A2 (624651-UK)	1	7	47.9	33.4	31.4	24.4	13.4	7.4	5.4	2.4	27
15	PURY-P600YSNW-A2 (624651-UK)	1	7	47	32.5	30.5	23.5	12.5	6.5	4.5	1.5	27
16	PURY-P550YNW-A2 (622112-UK)	1	7	47.3	33.3	29.3	23.3	11.3	6.3	8.3	3.3	26
17	PURY-P650YSNW-A2 (624652-UK)	1	7	45.3	33.3	30.3	24.3	13.3	8.3	5.3	1.3	26
18	PURY-P300YNW-A2 (622107-UK)	1	7	42.1	28.1	25.1	20.1	8.1	2.1	0.1	-2.9	22
19	PURY-P500YNW-A2 (622111-UK)	1	7	44.2	33.2	29.2	21.2	9.2	6.2	6.2	1.2	25
20	PURY-P650YSNW-A2 (624652-UK)	1	7	44	32	29	24	12	7	4	0	26
21	PURY-P600YSNW-A2 (624651-UK)	1	7	45.3	30.8	28.8	22.8	10.8	4.8	2.8	-0.2	25
22	PURY-P550YNW-A2 (622112-UK)	1	7	45.5	31.5	27.5	22.5	9.5	4.5	6.5	1.5	25
23	PURY-P500YNW-A2 (622111-UK)	1	7	47.6	36.6	31.6	23.6	11.6	8.6	9.6	4.6	28
24	PURY-P650YSNW-A2 (624652-UK)	1	7	47.6	35.6	31.6	26.6	14.6	9.6	7.6	3.6	28
25	PURY-P300YNW-A2 (622107-UK)	1	7	44.5	30.5	26.5	21.5	9.5	3.5	2.5	-0.5	24
26	PURY-P500YNW-A2 (622111-UK)	1	7	47	36	31	23	11	8	9	4	27
27	PURY-P650YSNW-A2 (624652-UK)	1	7	46.7	34.7	30.7	25.7	13.7	8.7	6.7	2.7	28
28	PURY-P600YSNW-A2 (624651-UK)	1	7	47.9	33.4	31.4	24.4	13.4	7.4	5.4	2.4	27
29	PURY-P600YSNW-A2 (624651-UK)	1	7	47.4	32.9	30.9	23.9	12.9	6.9	4.9	1.9	27
30	PURY-P500YNW-A2 (622111-UK)	1	7	45.3	34.3	30.3	21.3	10.3	7.3	7.3	2.3	26
31	PURY-P650YSNW-A2 (624652-UK)	1	7	45.3	33.3	30.3	24.3	13.3	8.3	5.3	1.3	26
32	PURY-P300YNW-A2 (622107-UK)	1	7	42.1	28.1	25.1	20.1	8.1	2.1	0.1	-2.9	22
33	PURY-P500YNW-A2 (622111-UK)	1	7	44.2	33.2	29.2	21.2	9.2	6.2	6.2	1.2	25
34	PURY-P650YSNW-A2 (624652-UK)	1	7	44	32	29	24	12	7	4	0	26
35	PURY-P600YSNW-A2 (624651-UK)	1	7	45.3	30.8	28.8	22.8	10.8	4.8	2.8	-0.2	25
36	PURY-P600YSNW-A2 (624651-UK)	1	7	45	30.5	28.5	22.5	10.5	4.5	2.5	-0.5	25
37	PURY-P500YNW-A2 (622111-UK)	1	11	42.7	29.7	23.7	13.7	1.7	-3.3	-5.3	-11.3	21
38	PURY-P750YSNW-A2 (624654-UK)	1	11	40.5	28.5	25.5	18.5	7.5	-0.5	-5.5	-9.5	21
39	PURY-P550YNW-A2 (622112-UK)	1	11	44.1	28.1	22.1	15.1	2.1	-4.9	-4.9	-10.9	21
40	PURY-P650YSNW-A2 (624652-UK)	1	11	42.3	28.3	23.3	16.3	4.3	-2.7	-7.7	-12.7	20
41	PURY-P600YSNW-A2 (624651-UK)	1	11	43.6	27.1	23.1	15.1	3.1	-4.9	-8.9	-12.9	21
42	PURY-P600YSNW-A2 (624651-UK)	1	11	43.3	26.8	22.8	14.8	2.8	-5.2	-9.2	-13.2	20
43	PURY-P500YNW-A2 (622111-UK)	1	11	42.3	29.3	23.3	13.3	1.3	-3.7	-5.7	-11.7	20
44	PURY-P750YSNW-A2 (624654-UK)	1	11	40.5	28.5	25.5	18.5	7.5	-0.5	-5.5	-9.5	21
45	PURY-P650YSNW-A2 (624652-UK)	1	11	42	28	23	16	4	-3	-8	-13	20
46	PURY-P400YNW-A2 (622109-UK)	1	11	38.1	25.1	22.1	15.1	4.1	-2.9	-7.9	-11.9	18
47	PURY-P650YSNW-A2 (624652-UK)	1	11	41.9	27.9	22.9	15.9	3.9	-3.1	-8.1	-13.1	20
48	PURY-P600YSNW-A2 (624651-UK)	1	11	43	26.5	22.5	14.5	2.5	-5.5	-9.5	-13.5	20
49	PURY-P500YNW-A2 (622111-UK)	1	11	41.6	28.6	22.6	12.6	0.6	-4.4	-6.4	-12.4	19
50	PURY-P450YNW-A2 (622110-UK)	1	11	37.2	25.2	22.2	15.2	4.2	-2.8	-7.8	-11.8	18
51	PURY-P450YNW-A2 (622110-UK)	1	11	37	25	22	15	4	-3	-8	-12	18
52	PURY-P400YNW-A2 (622109-UK)	1	11	37.7	24.7	21.7	14.7	3.7	-3.3	-8.3	-12.3	18
53	PURY-P500YNW-A2 (622111-UK)	1	11	41.2	29.2	22.2	12.2	1.2	-3.8	-5.8	-12.8	19
54	PURY-P400YNW-A2 (622109-UK)	1	11	37.7	24.7	21.7	14.7	3.7	-3.3	-8.3	-12.3	18
55	PURY-P500YNW-A2 (622111-UK)	1	11	40.8	28.8	21.8	11.8	0.8	-4.2	-6.2	-13.2	19
56	PURY-P400YNW-A2 (622109-UK)	1	11	37.3	24.3	21.3	14.3	3.3	-3.7	-8.7	-12.7	17
57	PURY-P500YNW-A2 (622111-UK)	1	11	41.1	29.1	22.1	12.1	1.1	-3.9	-5.9	-12.9	19
58	PURY-P250YNW-A2 (622106-UK)	1	11	40.4	21.9	15.9	8.9	-4.1	-11.1	-10.1	-15.1	16
59	PURY-P300YNW-A2 (622107-UK)	1	11	37.9	21.9	16.9	9.9	-2.1	-10.1	-14.1	-18.1	15

High St (mid) - wall composite SRI								
63	125	250	500	1k	2k	4k	8k	dBA
23.1	15.1	6.1	3.1	-6.9	-9.9	-10.9	-10.9	5
22.9	14.9	5.9	2.9	-7.1	-10.1	-11.1	-11.1	5
22.7	14.7	5.7	2.7	-7.3	-10.3	-11.3	-11.3	5
23.3	15.3	8.3	5.3	-4.7	-6.7	-7.7	-8.7	7
23.3	15.3	8.3	5.3	-4.7	-6.7	-7.7	-8.7	7
23.1	15.1	8.1	5.1	-4.9	-6.9	-7.9	-8.9	7
23.1	15.1	8.1	5.1	-4.9	-6.9	-7.9	-8.9	7
46.3	35.3	31.3	24.3	12.3	10.3	11.3	6.3	27
46.3	35.3	31.3	24.3	12.3	10.3	11.3	6.3	27
45.8	33.8	30.8	26.8	14.8	10.8	8.8	4.8	28
41.5	31.5	30.5	26.5	15.5	11.5	9.5	6.5	27
43.1	29.1	26.1	22.1	10.1	5.1	4.1	1.1	23
45.4	33.4	30.4	26.4	14.4	10.4	8.4	4.4	27
46.9	32.4	30.4	25.4	13.4	8.4	7.4	4.4	27
46.2	31.7	29.7	24.7	12.7	7.7	6.7	3.7	26
46.4	32.4	28.4	24.4	11.4	7.4	10.4	5.4	26
44.4	32.4	29.4	25.4	13.4	9.4	7.4	3.4	26
41.4	27.4	24.4	20.4	8.4	3.4	2.4	-0.6	22
43.6	32.6	28.6	21.6	9.6	7.6	8.6	3.6	25
43.4	31.4	28.4	24.4	12.4	8.4	6.4	2.4	25
44.7	30.2	28.2	23.2	11.2	6.2	5.2	2.2	25
45	31	27	23	10	6	9	4	25
46.3	35.3	31.3	24.3	12.3	10.3	11.3	6.3	27
46.3	34.3	31.3	27.3	15.3	11.3	9.3	5.3	28
43.3	29.3	26.3	22.3	10.3	5.3	4.3	1.3	24
45.8	34.8	30.8	23.8	11.8	9.8	10.8	5.8	27
45.6	33.6	30.6	26.6	14.6	10.6	8.6	4.6	28
46.9	32.4	30.4	25.4	13.4	8.4	7.4	4.4	27
46.5	32	30	25	13	8	7	4	27
44.4	33.4	29.4	22.4	10.4	8.4	9.4	4.4	25
44.4	32.4	29.4	25.4	13.4	9.4	7.4	3.4	26
41.4	27.4	24.4	20.4	8.4	3.4	2.4	-0.6	22
43.6	32.6	28.6	21.6	9.6	7.6	8.6	3.6	25
43.4	31.4	28.4	24.4	12.4	8.4	6.4	2.4	25
44.7	30.2	28.2	23.2	11.2	6.2	5.2	2.2	25
44.5	30	28	23	11	6	5	2	25
48.1	36.1	32.1	24.1	12.1	9.1	10.1	5.1	28
45.9	34.9	33.9	28.9	17.9	11.9	9.9	6.9	30
49.4	34.4	30.4	25.4	12.4	7.4	10.4	5.4	28
47.6	34.6	31.6	26.6	14.6	9.6	7.6	3.6	28
48.9	33.4	31.4	25.4	13.4	7.4	6.4	3.4	28
48.5	33	31	25	13	7	6	3	28
47.6	35.6	31.6	23.6	11.6	8.6	9.6	4.6	28
45.6	34.6	33.6	28.6	17.6	11.6	9.6	6.6	30
47.1	34.1	31.1	26.1	14.1	9.1	7.1	3.1	28
43.1	31.1	30.1	25.1	14.1	9.1	7.1	4.1	26
47	34	31	26	14	9	7	3	28
48.1	32.6	30.6	24.6	12.6	6.6	5.6	2.6	27
46.7	34.7	30.7	22.7	10.7	7.7	8.7	3.7	27
42.2	31.2	30.2	25.2	14.2	9.2	7.2	4.2	26
42	31	30	25	14	9	7	4	26
42.7	30.7	29.7	24.7	13.7	8.7	6.7	3.7	26
46.2	35.2	30.2	22.2	11.2	8.2	9.2	3.2	26
42.6	30.6	29.6	24.6	13.6	8.6	6.6	3.6	26
45.6	34.6	29.6	21.6	10.6	7.6	8.6	2.6	26
42.2	30.2	29.2	24.2	13.2	8.2	6.2	3.2	25
46.1	35.1	30.1	22.1	11.1	8.1	9.1	3.1	26
45.2	27.7	23.7	18.7	5.7	0.7	4.7	0.7	22
42.7	27.7	24.7	19.7	7.7	1.7	0.7	-2.3	22

Cumulative Sound Levels at Receptor (Direct + Reverberant) - NIGHT-TIME

High St (lower) - wall composite SRI												
Ref	Model	No	Location	63	125	250	500	1k	2k	4k	8k	dBA
1	PUZ-ZM50VKA2 (599302-UK)	1	7	24.1	16.1	7.1	2.1	-6.9	-10.9	-12.9	-12.9	5
2	PUZ-ZM35VKA2 (599231-UK)	1	7	23.8	15.8	6.8	1.8	-7.2	-11.2	-13.2	-13.2	5
3	PUZ-ZM50VKA2 (599302-UK)	1	7	23.5	15.5	6.5	1.5	-7.5	-11.5	-13.5	-13.5	5
4	PUZ-ZM100YDA1TH (698831-UK)	1	7	24.1	16.1	9.1	4.1	-4.9	-7.9	-9.9	-10.9	7
5	PUZ-ZM100YDA1TH (698831-UK)	1	7	24.1	16.1	9.1	4.1	-4.9	-7.9	-9.9	-10.9	7
6	PUZ-ZM100YDA1TH (698831-UK)	1	7	23.8	15.8	8.8	3.8	-5.2	-8.2	-10.2	-11.2	6
7	PUZ-ZM100YDA1TH (698831-UK)	1	7	23.8	15.8	8.8	3.8	-5.2	-8.2	-10.2	-11.2	6
8	PURY-P500YNW-A2 (622111-UK)	1	7	37.6	29.6	21.6	9.6	1.6	-2.4	-1.4	-5.4	18
9	PURY-P500YNW-A2 (622111-UK)	1	7	37.6	29.6	21.6	9.6	1.6	-2.4	-1.4	-5.4	18
10	PURY-P650YSNW-A2 (624652-UK)	1	7	28	26	17	11	0	-6	-4	-3	14
11	PURY-P450YNW-A2 (622110-UK)	1	7	33.7	25.7	16.7	10.7	2.7	-1.3	-2.3	2.7	15
12	PURY-P300YNW-A2 (622107-UK)	1	7	23.2	21.2	11.2	7.2	-4.8	-10.8	-8.8	-7.8	9
13	PURY-P650YSNW-A2 (624652-UK)	1	7	27.4	25.4	17.4	10.4	0.4	-5.6	-4.6	-3.6	14
14	PURY-P600YSNW-A2 (624651-UK)	1	7	26.4	24.4	15.4	10.4	-0.6	-6.6	-5.6	-4.6	13
15	PURY-P600YSNW-A2 (624651-UK)	1	7	25.5	23.5	14.5	9.5	-1.5	-7.5	-6.5	-5.5	12
16	PURY-P550YNW-A2 (622112-UK)	1	7	25.3	23.3	13.3	8.3	-3.7	-8.7	-7.7	-1.7	11
17	PURY-P650YSNW-A2 (624652-UK)	1	7	26.3	24.3	16.3	9.3	-0.7	-6.7	-5.7	-4.7	13
18	PURY-P300YNW-A2 (622107-UK)	1	7	21.1	19.1	10.1	6.1	-5.9	-11.9	-10.9	-9.9	8
19	PURY-P500YNW-A2 (622111-UK)	1	7	34.2	26.2	19.2	7.2	-0.8	-4.8	-4.8	-8.8	15
20	PURY-P650YSNW-A2 (624652-UK)	1	7	25	23	15	9	-2	-8	-7	-6	12
21	PURY-P600YSNW-A2 (624651-UK)	1	7	23.8	21.8	12.8	8.8	-3.2	-9.2	-8.2	-7.2	11
22	PURY-P550YNW-A2 (622112-UK)	1	7	23.5	21.5	11.5	7.5	-5.5	-10.5	-4.5	-3.5	10
23	PURY-P500YNW-A2 (622111-UK)	1	7	37.6	29.6	21.6	9.6	1.6	-2.4	-1.4	-5.4	18
24	PURY-P650YSNW-A2 (624652-UK)	1	7	28.6	26.6	17.6	11.6	0.6	-5.4	-3.4	-2.4	15
25	PURY-P300YNW-A2 (622107-UK)	1	7	23.5	21.5	11.5	7.5	-4.5	-10.5	-8.5	-7.5	10
26	PURY-P500YNW-A2 (622111-UK)	1	7	37	29	21	9	1	-3	-2	-6	17
27	PURY-P650YSNW-A2 (624652-UK)	1	7	27.7	25.7	16.7	10.7	-0.3	-6.3	-4.3	-3.3	14
28	PURY-P600YSNW-A2 (624651-UK)	1	7	26.4	24.4	15.4	10.4	-0.6	-6.6	-5.6	-4.6	13
29	PURY-P600YSNW-A2 (624651-UK)	1	7	25.9	23.9	14.9	9.9	-1.1	-7.1	-6.1	-5.1	12
30	PURY-P500YNW-A2 (622111-UK)	1	7	35.3	27.3	20.3	7.3	0.3	-3.7	-3.7	-7.7	16
31	PURY-P650YSNW-A2 (624652-UK)	1	7	26.3	24.3	16.3	9.3	-0.7	-6.7	-5.7	-4.7	13
32	PURY-P300YNW-A2 (622107-UK)	1	7	21.1	19.1	10.1	6.1	-5.9	-11.9	-10.9	-9.9	8
33	PURY-P500YNW-A2 (622111-UK)	1	7	34.2	26.2	19.2	7.2	-0.8	-4.8	-4.8	-8.8	15
34	PURY-P650YSNW-A2 (624652-UK)	1	7	25	23	15	9	-2	-8	-7	-6	12
35	PURY-P600YSNW-A2 (624651-UK)	1	7	23.8	21.8	12.8	8.8	-3.2	-9.2	-8.2	-7.2	11
36	PURY-P600YSNW-A2 (624651-UK)	1	7	23.5	21.5	12.5	8.5	-3.5	-9.5	-8.5	-7.5	10
37	PURY-P500YNW-A2 (622111-UK)	1	11	32.7	22.7	13.7	-0.3	-8.3	-14.3	-16.3	-21.3	11
38	PURY-P750YSNW-A2 (624654-UK)	1	11	29.5	21.5	10.5	2.5	-5.5	-12.5	-15.5	-11.5	9
39	PURY-P550YNW-A2 (622112-UK)	1	11	22.1	18.1	6.1	0.1	-12.9	-19.9	-15.9	-15.9	5
40	PURY-P650YSNW-A2 (624652-UK)	1	11	23.3	19.3	9.3	1.3	-9.7	-17.7	-18.7	-18.7	7
41	PURY-P600YSNW-A2 (624651-UK)	1	11	22.1	18.1	7.1	1.1	-10.9	-18.9	-19.9	-19.9	5
42	PURY-P600YSNW-A2 (624651-UK)	1	11	21.8	17.8	6.8	0.8	-11.2	-19.2	-20.2	-20.2	5
43	PURY-P500YNW-A2 (622111-UK)	1	11	32.3	22.3	13.3	-0.7	-8.7	-14.7	-16.7	-21.7	11
44	PURY-P750YSNW-A2 (624654-UK)	1	11	29.5	21.5	10.5	2.5	-5.5	-12.5	-15.5	-11.5	9
45	PURY-P650YSNW-A2 (624652-UK)	1	11	23	19	9	1	-10	-18	-19	-19	6
46	PURY-P400YNW-A2 (622109-UK)	1	11	28.1	18.1	7.1	-0.9	-7.9	-14.9	-18.9	-12.9	7
47	PURY-P650YSNW-A2 (624652-UK)	1	11	22.9	18.9	8.9	0.9	-10.1	-18.1	-19.1	-19.1	6
48	PURY-P600YSNW-A2 (624651-UK)	1	11	21.5	17.5	6.5	0.5	-11.5	-19.5	-20.5	-20.5	5
49	PURY-P500YNW-A2 (622111-UK)	1	11	31.6	21.6	12.6	-1.4	-9.4	-15.4	-17.4	-22.4	10
50	PURY-P450YNW-A2 (622110-UK)	1	11	28.2	18.2	8.2	0.2	-7.8	-13.8	-17.8	-13.8	7
51	PURY-P450YNW-A2 (622110-UK)	1	11	28	18	8	0	-8	-14	-18	-14	7
52	PURY-P400YNW-A2 (622109-UK)	1	11	27.7	17.7	6.7	-1.3	-8.3	-15.3	-19.3	-13.3	6
53	PURY-P500YNW-A2 (622111-UK)	1	11	32.2	21.2	13.2	-0.8	-8.8	-14.8	-16.8	-22.8	10
54	PURY-P400YNW-A2 (622109-UK)	1	11	27.7	17.7	6.7	-1.3	-8.3	-15.3	-19.3	-13.3	6
55	PURY-P500YNW-A2 (622111-UK)	1	11	31.8	20.8	12.8	-1.2	-9.2	-15.2	-17.2	-23.2	10
56	PURY-P400YNW-A2 (622109-UK)	1	11	27.3	17.3	6.3	-1.7	-8.7	-15.7	-19.7	-13.7	6
57	PURY-P500YNW-A2 (622111-UK)	1	11	32.1	21.1	13.1	-0.9	-8.9	-14.9	-16.9	-22.9	10
58	PURY-P250YNW-A2 (622106-UK)	1	11	15.9	10.9	-4.1	-8.1	-21.1	-28.1	-20.1	-20.1	-2
59	PURY-P300YNW-A2 (622107-UK)	1	11	16.9	12.9	-1.9	-4.1	-16.1	-24.1	-25.1	-25.1	0

High St (mid) - wall composite SRI								
63	125	250	500	1k	2k	4k	8k	dBA
23.1	15.1	6.1	3.1	-6.9	-9.9	-10.9	-10.9	5
22.9	14.9	5.9	2.9	-7.1	-10.1	-11.1	-11.1	5
22.7	14.7	5.7	2.7	-7.3	-10.3	-11.3	-11.3	5
23.3	15.3	8.3	5.3	-4.7	-6.7	-7.7	-8.7	7
23.3	15.3	8.3	5.3	-4.7	-6.7	-7.7	-8.7	7
23.1	15.1	8.1	5.1	-4.9	-6.9	-7.9	-8.9	7
23.1	15.1	8.1	5.1	-4.9	-6.9	-7.9	-8.9	7
36.3	28.3	21.3	10.3	2.3	-0.7	0.3	-3.7	17
36.3	28.3	21.3	10.3	2.3	-0.7	0.3	-3.7	17
26.8	24.8	16.8	11.8	0.8	-4.2	-2.2	-1.2	14
32.5	24.5	16.5	11.5	3.5	0.5	-0.5	4.5	15
22.1	20.1	11.1	8.1	-3.9	-8.9	-6.9	-5.9	9
26.4	24.4	16.4	11.4	0.4	-4.6	-2.6	-1.6	14
25.4	23.4	14.4	11.4	-0.6	-5.6	-3.6	-2.6	13
24.7	22.7	13.7	10.7	-1.3	-6.3	-4.3	-3.3	12
24.4	22.4	12.4	9.4	-3.6	-7.6	-0.6	0.4	12
25.4	23.4	15.4	10.4	-0.6	-5.6	-3.6	-2.6	13
20.4	18.4	9.4	6.4	-5.6	-10.6	-8.6	-7.6	8
33.6	25.6	18.6	7.6	-0.4	-3.4	-2.4	-6.4	15
24.4	22.4	14.4	9.4	-1.6	-6.6	-4.6	-3.6	12
23.2	21.2	12.2	9.2	-2.8	-7.8	-5.8	-4.8	11
23	21	11	8	-5	-9	-2	-1	10
36.3	28.3	21.3	10.3	2.3	-0.7	0.3	-3.7	17
27.3	25.3	17.3	12.3	1.3	-3.7	-1.7	-0.7	15
22.3	20.3	11.3	8.3	-3.7	-8.7	-6.7	-5.7	10
35.8	27.8	20.8	9.8	1.8	-1.2	-0.2	-4.2	17
26.6	24.6	16.6	11.6	0.6	-4.4	-2.4	-1.4	14
25.4	23.4	14.4	11.4	-0.6	-5.6	-3.6	-2.6	13
25	23	14	11	-1	-6	-4	-3	12
34.4	26.4	19.4	8.4	0.4	-2.6	-1.6	-5.6	15
25.4	23.4	15.4	10.4	-0.6	-5.6	-3.6	-2.6	13
20.4	18.4	9.4	6.4	-5.6	-10.6	-8.6	-7.6	8
33.6	25.6	18.6	7.6	-0.4	-3.4	-2.4	-6.4	15
24.4	22.4	14.4	9.4	-1.6	-6.6	-4.6	-3.6	12
23.2	21.2	12.2	9.2	-2.8	-7.8	-5.8	-4.8	11
23	21	12	9	-3	-8	-6	-5	10
38.1	29.1	22.1	10.1	2.1	-1.9	-0.9	-4.9	18
34.9	27.9	18.9	12.9	4.9	-0.1	-0.1	4.9	17
27.4	24.4	14.4	10.4	-2.6	-7.6	-0.6	0.4	13
28.6	25.6	17.6	11.6	0.6	-5.4	-3.4	-2.4	14
27.4	24.4	15.4	11.4	-0.6	-6.6	-4.6	-3.6	13
27	24	15	11	-1	-7	-5	-4	13
37.6	28.6	21.6	9.6	1.6	-2.4	-1.4	-5.4	18
34.6	27.6	18.6	12.6	4.6	-0.4	-0.4	4.6	17
28.1	25.1	17.1	11.1	0.1	-5.9	-3.9	-2.9	14
33.1	24.1	15.1	9.1	2.1	-2.9	-3.9	3.1	14
28	25	17	11	0	-6	-4	-3	14
26.6	23.6	14.6	10.6	-1.4	-7.4	-5.4	-4.4	13
36.7	27.7	20.7	8.7	0.7	-3.3	-2.3	-6.3	17
33.2	24.2	16.2	10.2	2.2	-1.8	-2.8	2.2	14
33	24	16	10	2	-2	-3	2	14
32.7	23.7	14.7	8.7	1.7	-3.3	-4.3	2.7	13
37.2	27.2	21.2	9.2	1.2	-2.8	-1.8	-6.8	17
32.6	23.6	14.6	8.6	1.6	-3.4	-4.4	2.6	13
36.6	26.6	20.6	8.6	0.6	-3.4	-2.4	-7.4	16
32.2	23.2	14.2	8.2	1.2	-3.8	-4.8	2.2	13
37.1	27.1	21.1	9.1	1.1	-2.9	-1.9	-6.9	17
20.7	16.7	3.7	1.7	-11.3	-16.3	-5.3	-4.3	5
21.7	18.7	9.7	5.7	-6.3	-12.3	-10.3	-9.3	8