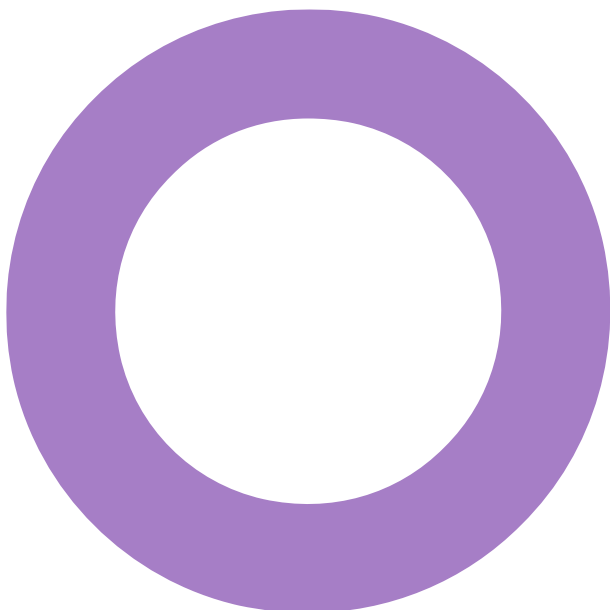


Nike, Arndale Centre. Manchester. Woods Bagot.

ACOUSTICS

PLANNING NOISE ASSESSMENT REPORT

REVISION 02 – 05 DECEMBER 2023



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	28/03/2023	Initial issue	AP	SG	PM
01	04/04/2023	Updated following further comments from building services engineer.	AP	SG	PM
02	05/12/2023	Updated to include assessment of final plant selections	AP	PM	PM

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Project number: 10/14721

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Executive summary

Hoare Lea Acoustics have been appointed to provide acoustic advice for a proposed new external plant installation associated with a Nike retail unit in the Manchester Arndale Centre.

An environmental noise survey has been carried out between 16 March and 22 March 2023.

The representative background sound levels measured during the survey were 54 dB $L_{A90,15min}$ during the daytime (07:00 to 23:00 hrs) and 52 dB $L_{A90,15min}$ at night-time (23:00 to 07:00 hrs).

Based on BS 4142:2014 and Manchester City Council guidance, all plant, equipment and machinery associated with the development shall be controlled to ensure that the overall sound pressure levels at 1 m from the façade of the nearest noise sensitive premises do not exceed 49 dB $L_{Ar,Tr}$ during the daytime (07:00 to 23:00 hrs) and 47 dB $L_{Ar,Tr}$ during the night (23:00 to 07:00 hrs). If the plant contains any tonal characteristics a further correction will be required.

An assessment has been carried out to predict the cumulative noise levels from all new external plant. An overall noise level of 41 dB L_{Aeq} is predicted. This is therefore compliant with the noise limits stipulated.

1. Introduction.

Hoare Lea Acoustics have been appointed to provide acoustic advice for a proposed new external plant installation associated with a Nike retail unit in the Manchester Arndale Centre.

An environmental noise survey has been carried out on site over 5 days commencing on Thursday 16 March 2023. The aim of the survey was to determine the existing noise levels around the site, with the purpose of establishing the prevalent ambient and representative background noise levels to set maximum noise egress limits for plant and machinery associated with the development.

This report presents the findings of the noise survey and sets out the permissible maximum plant noise egress limits in accordance with BS 4142:2014 guidance.

2. Site and development details.

2.1 Site location and proposals.

The proposed scheme comprises the installation of new external plant to serve the proposed new Nike store within the Manchester Arndale Centre.

An apartment building is located across Withy Grove approximately 30 m from the proposed plant location.

The proposed plant area and nearby noise sensitive receptor are highlighted below.

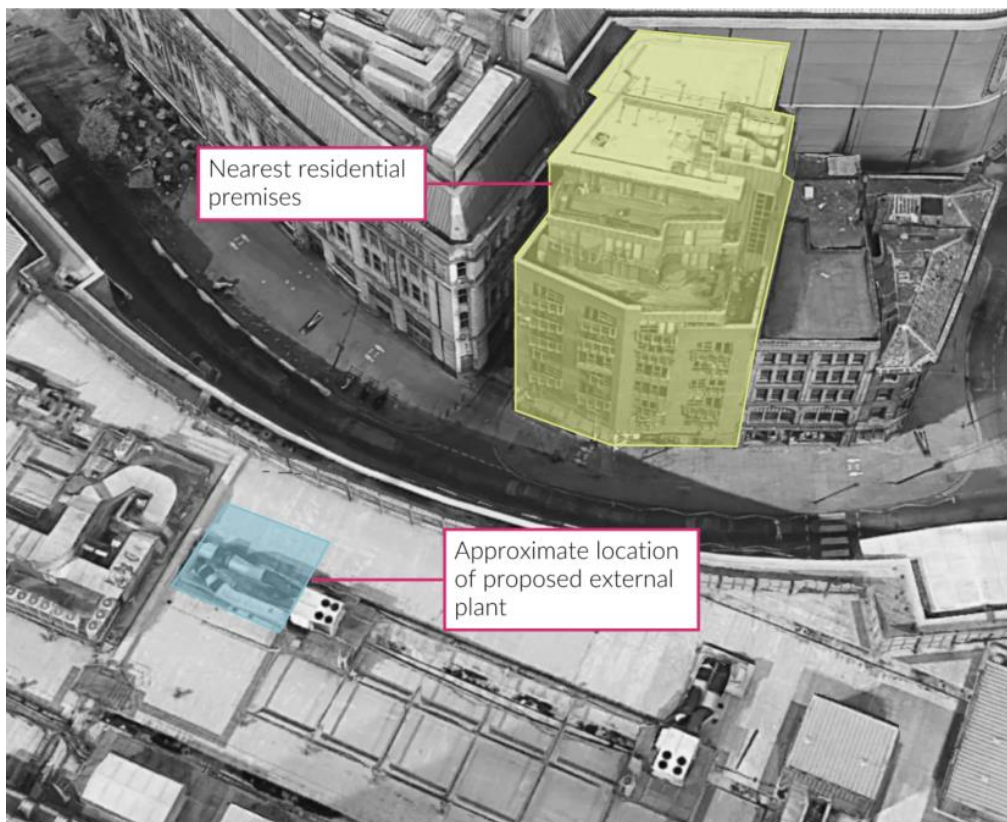


Figure 1 Aerial photograph indicating nearby noise sensitive premises (courtesy of Google Earth)

2.2 Surrounding area & noise climate.

The site is located within a relatively noisy area of central Manchester, with road traffic, including a high proportion of buses and HGVs, along Withy Grove. During the evening and nights, the area is expected to be lively due to the nearby Printworks complex of bars and nightclubs.

At roof level, existing plant from the Printworks and other retail plant associated with the Manchester Arndale are significant noise sources.

3. Acoustic criteria.

3.1 Local Authority planning guidance.

Criteria for plant noise egress are provided in the Manchester City Council (MCC) "Planning & Noise Technical Guidance (October 2022)" document.

With regards to noise from fixed plant/equipment, MCC refers to BS 4142:2014 and also states the following:

"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 brief summary of the standard guidance is presented below for reference.

3.2 BS 4142:2014.

Noise egress from any plant and machinery associated with the development should not cause disturbance at nearby sensitive premises.

The rating level for all new plant and machinery should be no more than equal to the existing representative background sound levels.

Further corrections should be applied if the plant noise contains tonal and/or impulsive characteristics. The magnitude of these corrections is dependent upon the subjective perceptibility of the tones/impulses present.

Where the Rating Level exceeds the background, the level of impact increases as shown below.

Table 1 BS 4142 assessment criteria

Comparison with background	Indicative assessment
+0 dB or below measured background	Low impact
+ 5 dB	Adverse impact
+ 10 dB or more above measured background	Significant adverse impact

4. Environmental noise survey.

4.1 Summary.

An environmental noise survey was carried out on site over a period of 5 days between 16 March and 23 March 2023. During this time, long-term unattended measurements were carried out. Full details of the equipment used, as well as weather information are provided in Appendix B. Detailed survey results are presented in Appendix C.

The survey measurement position is presented in the annotated aerial photograph presented in Figure 2.

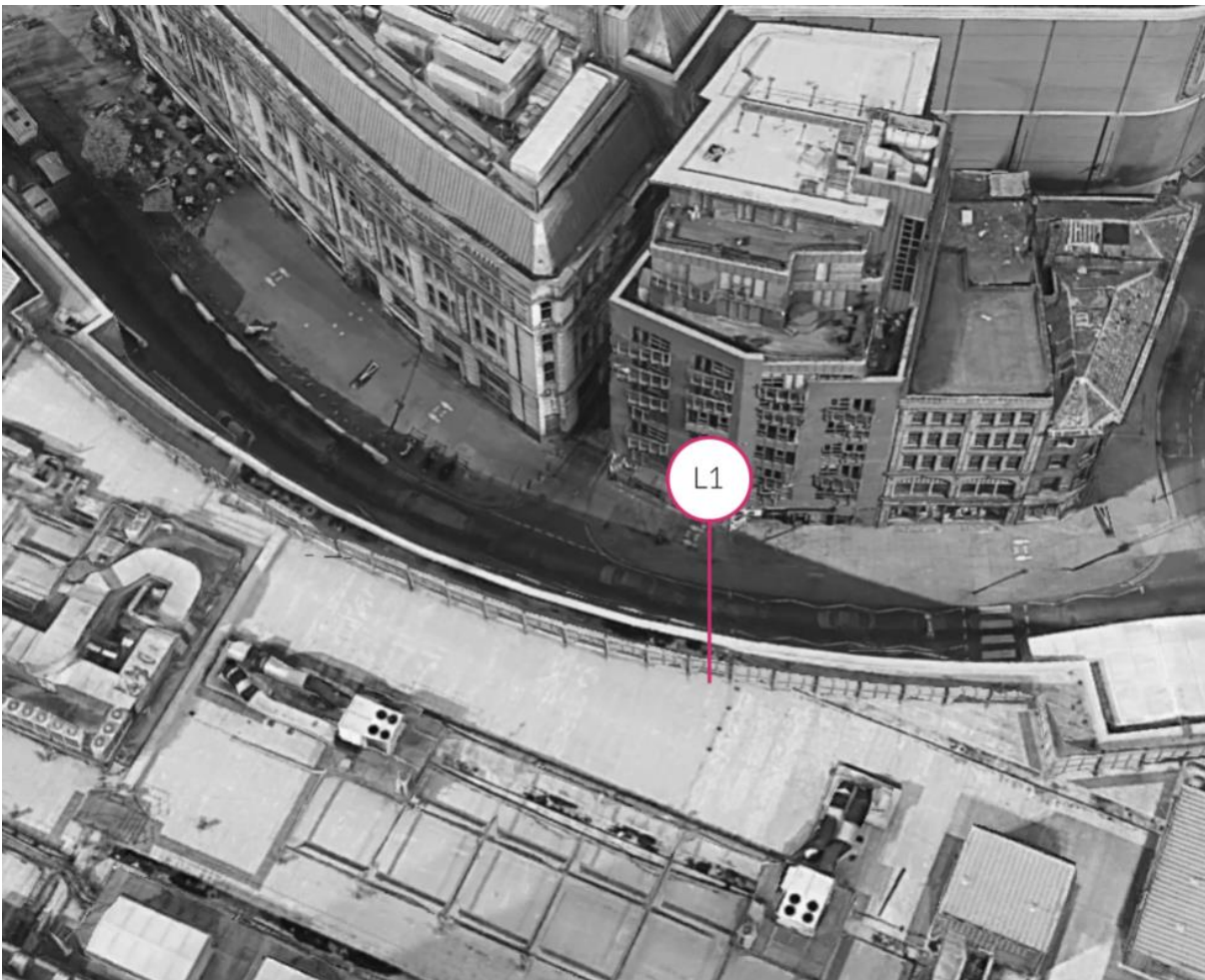


Figure 2 Aerial photograph indicating measurement positions and prevalent sound levels (courtesy of Google Earth)

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels during the periods of interest, the background sound levels have been quantified using statistical analysis from the continuous logging measurements. These are presented in Appendix D.

From the analysis carried out, the representative background sound levels measured during the survey were respectively 54 dB $L_{A90,15min}$ during the daytime period, and 52 dB $L_{A90,15min}$ during the night-time period.

4.2 Observations.

During installation of the noise monitoring equipment, the background sound level was driven by plant associated with the Printworks complex. During collection of the noise monitoring equipment, plant from nearby within the Arndale rooftop plant area was operational, which was driving the noise level at the time.

From analysis of the time history graph over the whole noise monitoring period, it is apparent that the nearby Arndale plant periodically switches on and off.

Due to the relative location of the noise monitoring equipment and apartment building in relation to the different plant sources, it is considered that the noise level measured from the Arndale plant is unrepresentatively high. This is because the microphone was closer to this noise source than the apartment building. There are adequate periods when the Arndale plant does not run to obtain the background sound level due to representative noise sources. It should, however, be noted that the existing Arndale plant noise source that has not been considered will still impact the apartment building. This is therefore considered to be a conservative design basis for setting new plant noise limits.

As the apartment building is slightly closer to the Printworks plant than the microphone, it is considered that the measured noise levels from this source are representative for the purposes of setting new plant noise limits.

5. Plant noise egress.

5.1 Plant noise limits.

Based on the criteria set out in Section 3 and the survey results, the cumulative maximum sound pressure levels for fixed plant, equipment and machinery associated with the development shall not exceed the levels presented in Table 2 at 1 m from the nearest noise sensitive premises.

Table 2 Maximum permissible sound pressure levels at 1m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from the nearest noise sensitive premises ($L_{Ar,T}$, dB) *
07:00 to 23:00 hours	49
23:00 to 07:00 hours	47

*If plant noise contains any tonal or impulsive characteristics, a further correction shall be applied to the levels set out above in accordance with BS 4142:2014.

5.2 Proposals and noise attenuation measures.

It is understood that the following new plant is proposed:

- 1x AHU
- 5x condenser units
- 1x toilet extract fan.

The proposed plant layout is shown in Figure 3. The noise data received is provided in Appendix E.

It is understood that the condenser units are to operate on demand basis during store opening hours. As such, they are not expected to operate during the night time (23:00 – 07:00).

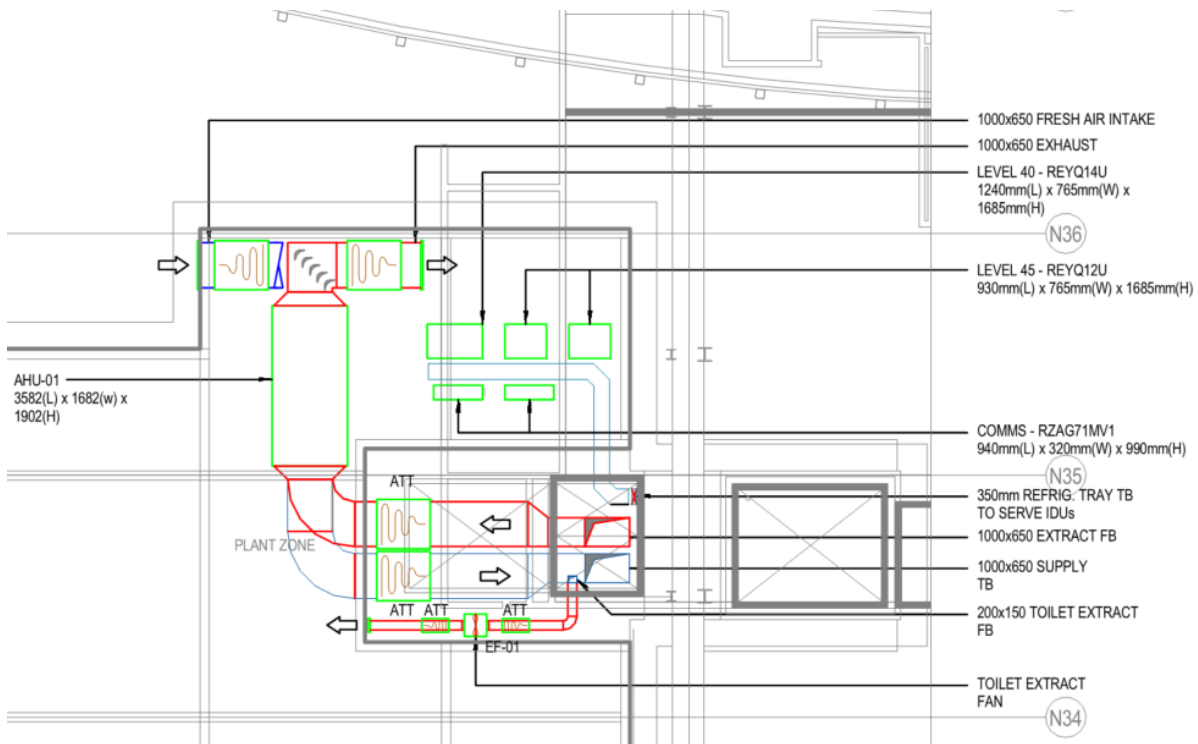


Figure 3 Proposed new plant layout

All noise generating plant and equipment associated with the development will be designed to ensure that the noise egress limits specified above are achieved.

The following noise attenuation measures are proposed:

- AHU – attenuators to be provided atmospheric connections.
- Toilet extract fan – attenuator to be provided to the atmospheric connection.

5.2.1 Assessment.

Calculations have been carried out to predict the noise level outside the nearest noise sensitive receptor. This takes into account the noise data and plant layouts received along with distance attenuation to the residential receptor. The calculations are provided in Appendix F for reference.

Based on this, the predicted cumulative noise level from all plant is **41 dB L_{Aeq}**. This is compliant with the plant noise limits stipulated above.

Appendix A: Policy and guidance.

National policy.

Noise Policy Statement for England.

The *Noise Policy Statement for England* (NPSE) advises that noise impacts should be assessed on the basis of adverse and significant adverse effects but does not provide any specific guidance on assessment methods or noise limits.

The NPSE introduces the concepts summarised in Table 3 that can be applied when considering the significance of noise impacts, which are applied by the World Health Organization.

The document advises that it is not possible to have '*a single objective noise based measure.... that is applicable to all sources of noise in all situations*'. It further advises that the sound level at which an adverse effect occurs is likely to be different for different noise sources, for different receptors at different times.

Effect Level 1	Description
No Observed Effect Level (NOEL)	This is the noise level below which no effect can be detected. In simple terms, below this level of noise, there is no detectable effect on health and quality of life due to the noise being assessed.
Lowest Observed Adverse Effect Level (LOAEL)	This is the level of noise above which adverse effects on health and quality of life can be detected.
Significant Observed Adverse Effect Level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.

Table 3: NPSE observed effect levels.

National Planning Policy Framework.

National Planning Policy Framework (NPPF) sets out the Government's planning policies and how these are expected to be applied. In relation to noise and vibration, NPPF section 15 paragraphs 170, 180 and 182 are presented below:

'170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e. preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability'

'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:

- 1. 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;*
- 2. 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

- 3. limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

'182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs).

Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

Planning Practice Guidance.

Online Planning Practice Guidance (PPG) has been published to provide greater details in relation to the relevance of noise to the planning process following the introduction of the NPPF and NPSE.

This guidance states, under the heading '*How to Determine the Noise Impact*', that the following should be considered by Local Authorities:

- *'whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.'*

In line with NPSE, this includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation during the operation of the Proposed Development.

Further guidance on each of the various observed effect levels set out in the NPSE is provided in the table detailed in the section headed 'How to Recognise when Noise could be a concern?' which is reproduced in Table 4.

It is important to note that no specific noise parameters are defined in the text or target noise levels provided. Under the heading 'What factors influence whether noise could be a Concern?', the subjective nature of noise is discussed. It is stated that there is no simple relationship between noise levels and the impact on those affected. This depends on how various factors combine in particular situations.

In respect of mixed-use developments, the following guidance is provided:

'When proposed developments could include activities that would be covered by the licensing regime, local planning authorities should consider whether the potential for adverse noise impacts will be addressed through licensing controls (including license conditions). Local planning authorities should not however presume that license conditions will provide for noise management in all instances and should liaise with the licensing authority.'

Perception	Example of outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not Intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.		No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect Level	Avoid
Noticeable and disruptive	Extensive and regular changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Table 4: PPG observed effects.

Local policy.

Manchester Core Strategy.

Manchester's Local Development Framework Core Strategy Development Plan Document was adopted in 2012. The document outlines the Council's vision for Manchester in 2027 and includes planning policies to be followed within the Manchester City Council area. The document includes two policies relating to noise and this development. The key paragraphs are presented below:

Policy SP1

The key spatial principles which will guide the strategic development of Manchester to 2027 are:

- *The City is covered by regeneration areas including the City Centre. All development should have regard to the character, issues and strategy for each regeneration area as described in the North, East, Central and South Manchester and Wythenshawe Strategic Regeneration Frameworks and the Manchester City Centre Strategic Plan.*

Development in all parts of the City should make a positive contribution to neighbourhoods of choice including:

- *creating well designed places that enhance or create character.*
- *making a positive contribution to the health, safety and wellbeing of residents*
- *considering the needs of all members of the community regardless of age, gender, disability, sexuality, religion, culture, ethnicity or income.*
- *protect and enhance the built and natural environment.*

Policy DM1

All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:

- *Impact on the surrounding areas in terms of the design, scale and appearance of the proposed development. Development should have regard to the character of the surrounding area.*
- *Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.*
- *Design for health.*

Unitary Development Plan for the City of Manchester.

Although the Unitary Development Plan for the City of Manchester (1995) has been superseded by the Manchester Core Strategy, some policies have been retained. One saved policy relates to noise and the key paragraphs are presented below:

Policy DC26

The Council intends to use the development control process to reduce the impact of noise on people living and working in, or visiting, the City. In giving effect to this intention, the Council will consider both:

- a. the effect of new development proposals which are likely to be generators of noise; and*
- b. the implications of new development being exposed to existing noise sources which are effectively outside planning control.*

Developments likely to result in unacceptably high levels of noises will not be permitted:

- a. in residential areas;*
- b. near schools, hospitals, nursing homes and similar institutions;*
- c. near open land used frequently for recreational purposes.*

The Council will control noise levels by requiring, where necessary, high levels of noise insulation in new development as well as noise barriers where this is appropriate.

Manchester City Council Noise and Planning Technical Guidance.

The Manchester City Council have produced supplementary technical guidance on noise and planning, released in 2022. This considered assessment methodologies and criteria for various aspects of noise within planning. The key paragraphs in relation to the proposed development are presented below:

3.6.1.5.1 Noise and Vibration from Fixed Plant / Equipment

Noise from fixed plant, equipment or machinery can be very annoying and disruptive to people living nearby particularly where that item involved emits a noise with impulsive or tonal characteristics.

Many of the noise complaints Environmental Health receive about noise from plant, equipment and machinery specifically concern the character of the noise emitted. Any noise assessment needs to consider not only the overall level of noise emitted but also its particular characteristics. The noise assessment should be based on BS 4142: 2014 and any application for fixed plant, equipment or machinery must demonstrate 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 (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.

By designing the sound pressure level of any plant items to generate a noise impact of at least 5dB below the existing background level, any plant noise impact should be of a negligible level which should not give rise to complaints from users or occupiers of existing noise-sensitive usages.

Past experience has shown that this criterion can be readily achieved. Where available, product specification data for new items should be submitted with the acoustic report. Consultants should be using these to compare with data from the noise survey, and propose mitigation where the levels are above those specified in the criterion. Where this information is not available a consultant may choose to measure the noise levels generated by the equipment in question where the equipment has already been installed elsewhere (and in accordance with the guidance in BS 4142).

Where fixed plant, equipment or machinery is attached to a building the vibration caused by it can pass through the building structure and cause structure borne noise elsewhere in the building. Where it is to be installed in or on a building containing a noise sensitive use structure borne noise should be considered in the noise assessment and adequate control measures should be proposed. An example of where this would be required is where there is a proposal to install fixed plant or equipment on the roof of a residential apartment block.

5.1.2 Noise generated within the development

The existing and expected noise source/s should first be identified and the following procedures should be applied:

- 1) select metrics to use for measuring or predicting noise levels (e.g. LAeq,T)*
- 2) assess effects of topography and other features, such as noise screens or reflecting surfaces.*
- 3) measure or predict noise levels at strategic points. In some complex situations it might be beneficial to produce a contour map of external noise levels.*
- 4) if appropriate, assess noise levels due to user activities around the development.*

The levels of existing noise and noise expected in the foreseeable future should be based on measurement where practicable, or may be predicted if there is reliable information.

5.2 Assessing noise

The following information MUST be included in all acoustic reports:

- *A statement of the reason for and scope of the report.*
- *Details of the proposed development to which the report relates.*
- *A location and development plan.*
- *A description of the area and environment surrounding the development site*
- *The methodology used to carry out the noise survey including the location of any noise monitoring locations, the equipment used and details of its last accredited calibration, and the weather conditions at the time the survey was carried out*
- *Full table of results.*
- *Assessment of the results in accordance to the relevant standards and policies.*
- *Recommendations for noise control measures if needed.*

- *Full calculations of the noise reductions expected to support any suggested noise control measures.*

5.3.1.4 Plant and Equipment

Noise from external plant, equipment or servicing items are assessed when determining planning applications. Typical equipment in both commercial and residential developments includes items such as air conditioning plant, retail refrigeration plant or lift motors.

Industrial developments are much more varied with the types of plant and equipment being entirely related to the industry in question.

The design aim here should be to meet the criterion in section 3.6.1.5.1. Consideration should initially be given to selecting the most low noise emitting models of plant and equipment possible. If this is not feasible, then it may be advisable to consider relocating noisy plant and equipment to a less noise sensitive area of the site and/or away from multiple reflecting surfaces.

It may also be possible to erect acoustic shielding around any necessary plant and equipment to contain noise and prevent it causing problems off-site. Some equipment may require additional acoustic mitigation measures to control the impacts from tonal noise or intermittent operation.

The use of any plant and equipment overnight usually causes an increase in noise sensitivity, so it may be advisable to limit use during night time periods if possible.

Consideration of the above measures at an early stage of the planning process is likely to progress an application more swiftly.

Recognised guidance.

British Standard 4142.

Current Government advice to Local Planning Authorities in both England and Wales refers to British Standard 4142:2014 (BS 4142) as being the appropriate guidance for assessing commercial operations and fixed building services plant noise. The British Standard provides an objective method for rating the significance of impact from industrial and commercial operations. It describes a means of determining sound levels from fixed plant installations and determining the background sound levels that prevail on a site.

The assessment of the impacts is based on the subtraction of the pre-existing background sound level ($L_{A90,T}$) from the rating level ($L_{A,r,T,r}$).

The standard does not give a definitive method for determining the background sound level but instead, as a commentary, states that *"the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods"*.

Clause 8.1.4, which discusses the monitoring duration, states *"there is no "single" background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed."* As a note to this clause the following commentary is given on obtaining a representative background sound level:

"To obtain a representative background sound level a series of either sequential or disaggregated measurements ought to be carried out for the period(s) of interest, possibly on more than one occasion. A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."

The rating level is defined objectively as the specific source noise level in question (either measured or predicted) with graduated corrections for tonality (up to +6 dB(A)), impulsivity (up to +9 dB(A)), intermittency (+3 dB(A)) and other sound characteristics (+3 dB(A)) which may be determined either subjectively or objectively, if necessary.

The background sound level is subtracted from the rating level. The following is considered when evaluating the potential impact:

- A difference of around +10 dB is likely to be an indication of a significant adverse impact, depending on context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context; and
- A difference of +0 dB or less is an indication of the specific sound source having a low impact, depending on the context.

It also states '*where background sound levels and rating levels are low, absolute levels might be as, or more, relevant that the margin by which the rating level exceeds the background. This is especially true at night.*'.

Appendix B: Survey and equipment details.

Equipment details

The details of the equipment used during the environmental noise survey.

All equipment used was within dates of calibration and calibration certificates are available on request.

Table 5 Equipment used during environmental noise survey

Description	Serial Number	Calibration Date
Rion - Sound Level Meter: NL-52	00297868	07/04/2021
Rion - Microphone: UC-59	14887	
Rion - Pre-amplifier: NH-25	88079	

Weather information

Weather reports for the area indicate that temperatures ranged between approximately 6 °C to 14 °C. Wind speeds were low and periods of rain were not sufficiently long to adversely affect the measurement results.

The measured data is therefore considered suitable as being representative of typical conditions.

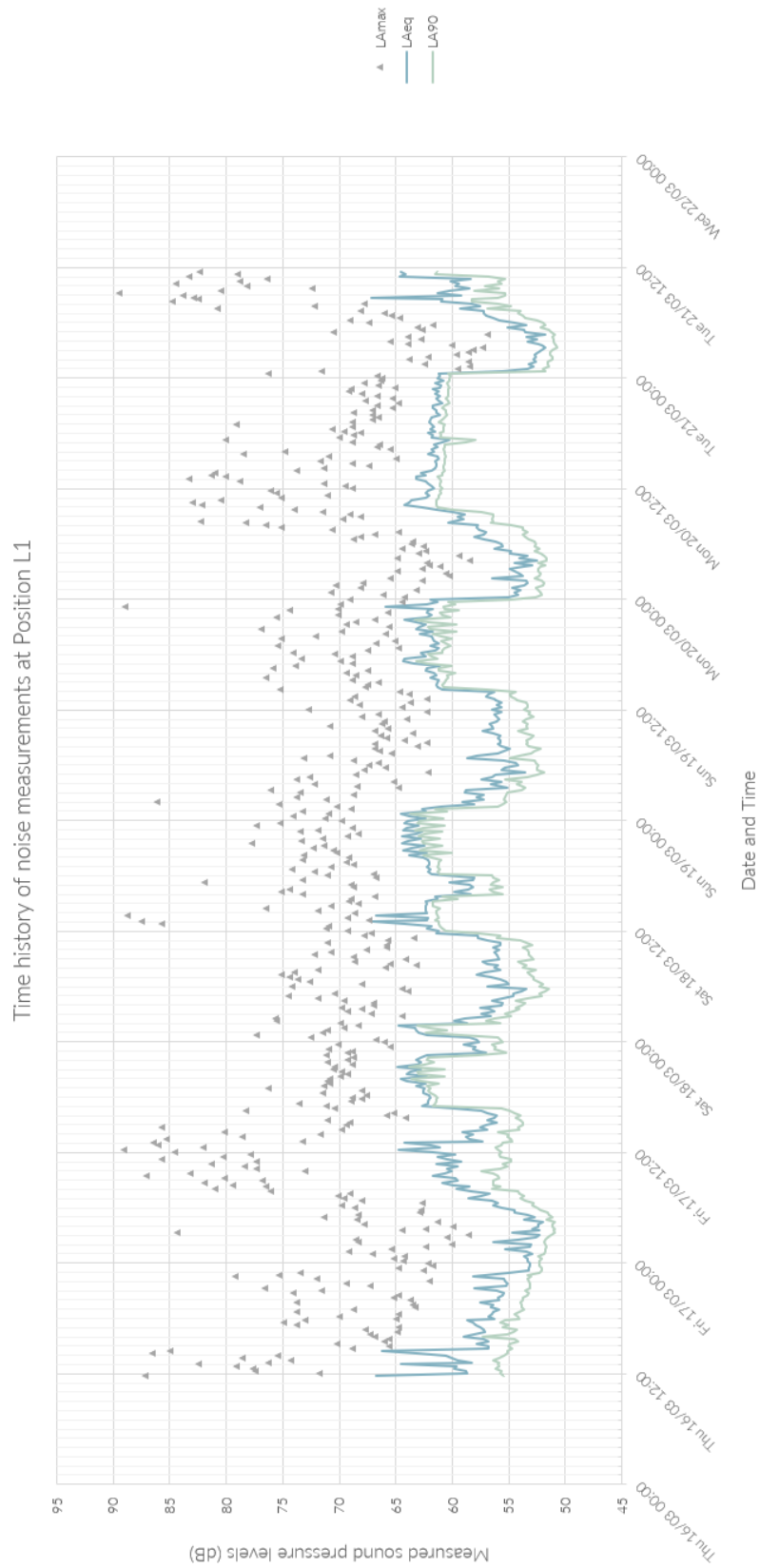
Appendix C: Detailed survey results.

Results.

Table B1 Ambient noise levels measured during unattended measurements

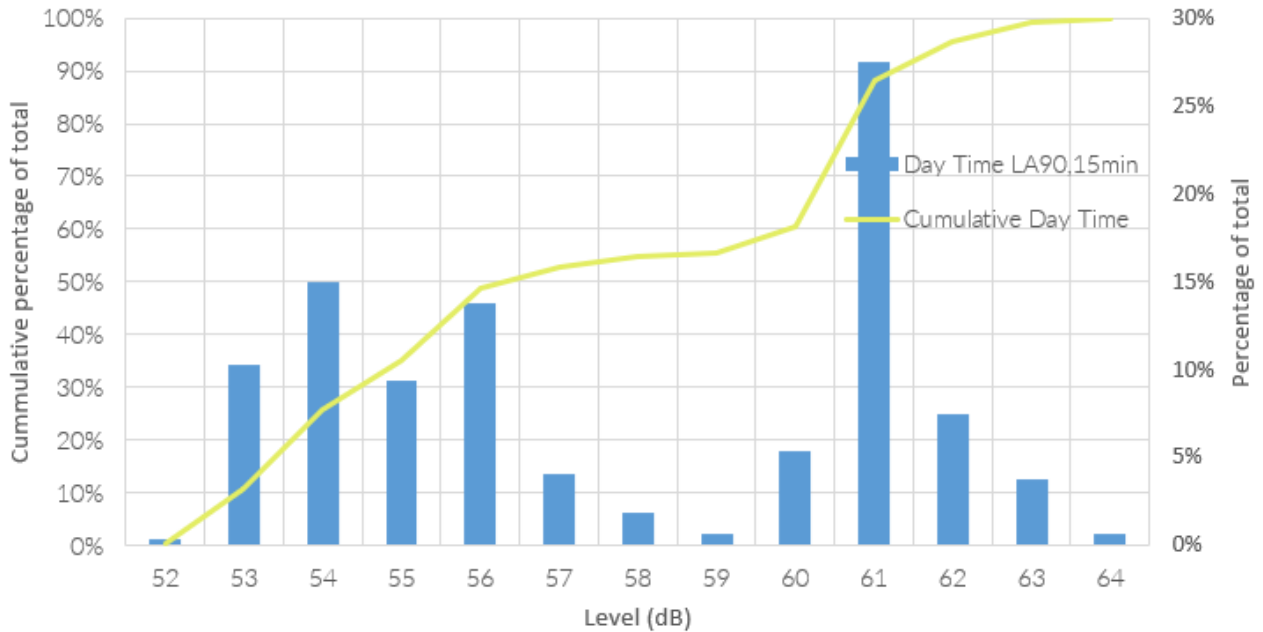
Date	Day time (07:00-23:00)	Night time (23:00 - 07:00)
	L _{Aeq,16hr} (dB)	L _{Aeq,8hr} (dB)
16/03/2023	60	54
17/03/2023	61	59
18/03/2023	61	60
19/03/2023	60	58
20/03/2023	62	57
21/03/2023	62	-

Time history graph at unattended position L1

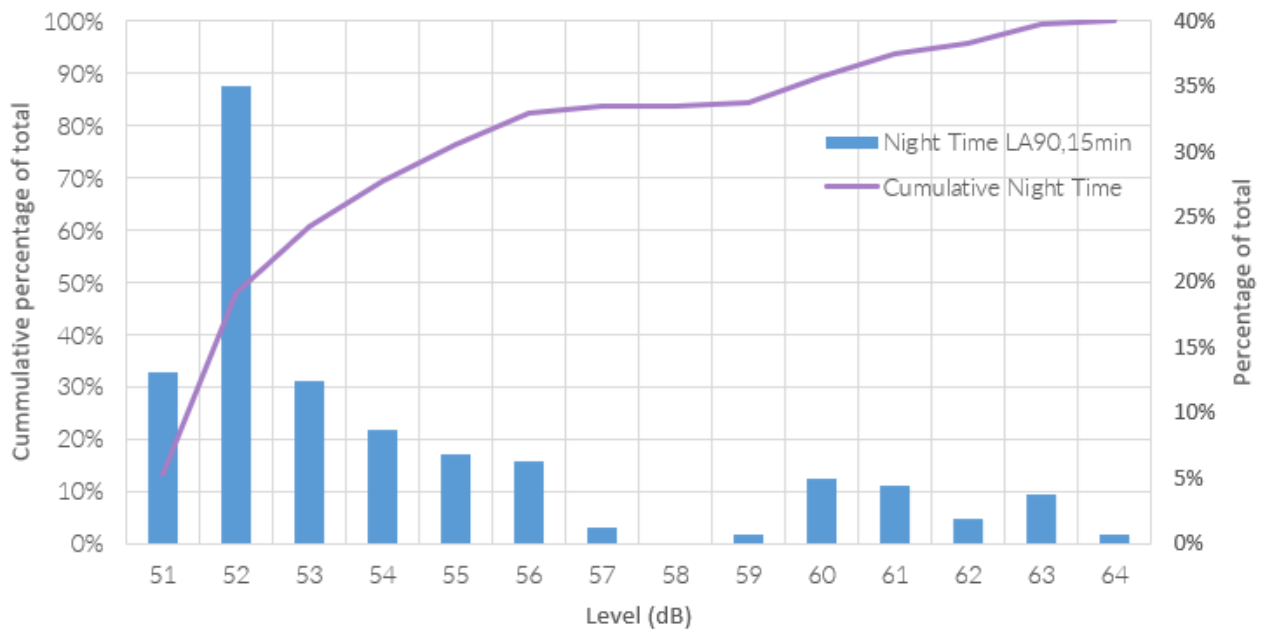


Appendix D: Statistical analysis of background levels measured.

Day (16hr) LA90,15min at L1

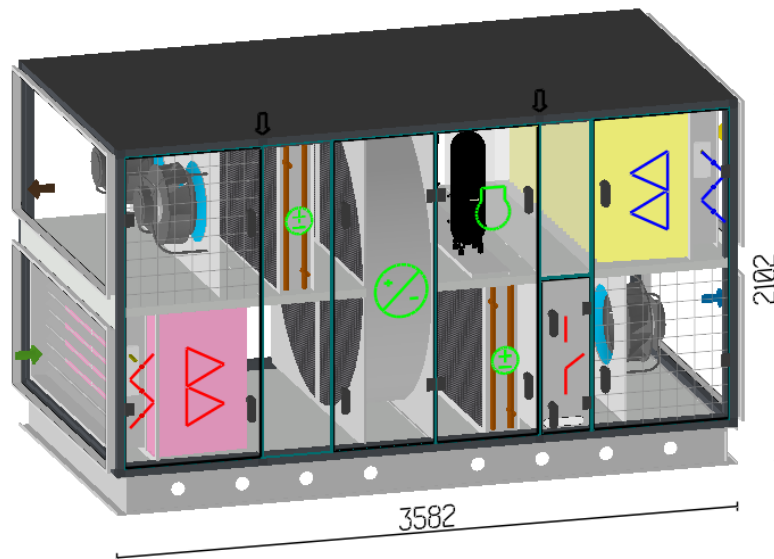


Night LA90,15min at L1



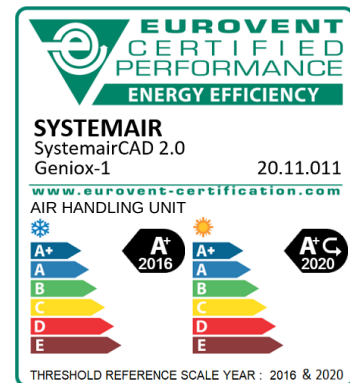
Appendix E: Noise datasheets received.

Description: Geniox 18 - Roof (Polyvinyl chloride roof)
Unit width / Weight: 1882 mm / 1876 kg
Delivery: 1 sections; Mounted on 218 mm base frame



Air/fan data	Supply air	Extract air	
Airflow (1.205 kg/m³); Face velocity	1.70 m³/s ; 1.14 m/s	1.70 m³/s ; 1.14 m/s	
External pressure	300 Pa	300 Pa	
Fans; Voltage; Rated current; RPM	(2 x 1.70) 3.40 kW; 3x400 V; (2 x 2.80) 5.60 A; 1378 RPM	(2 x 1.70) 3.40 kW; 3x400 V; (2 x 2.80) 5.60 A; 1432 RPM	
Unit color; Hygienic; Control system	ZincMagnesium; Standard; With control system		
Power supply	L1 + L2 + L3 + N + PE (3x400V) 50 Hz		
Consumed current	46.6 A		
Supply air, Winter ; Summer	20.0°C / RH 32% ; 18.0°C / RH 93%		
Reversible heat pump Winter / Summer	1.9 (7) kW ; COP 4 / 3.9 (19) kW ; EER 4.9; Refrigerant R410A		
Filter Supply / Extract	F7 - ePM1 60% / F9 - ePM1 90%		
Sound break out; Supply air	61 dB(A); 77 dB(A)		
Energy	Dimensioning	Average	Fans [kWh/year 3523 hours]
Heat Recovery (Wet / Dry)	82.1 % / 82.1 %	82.1 % / 82.1 %	
SFPv *)	1.58 kW/(m³/s)	1.58 kW/(m³/s)	9462 kWh

*) Values include speed control; SFPv = clean - and SFPe = dimensional-filter pressure drop

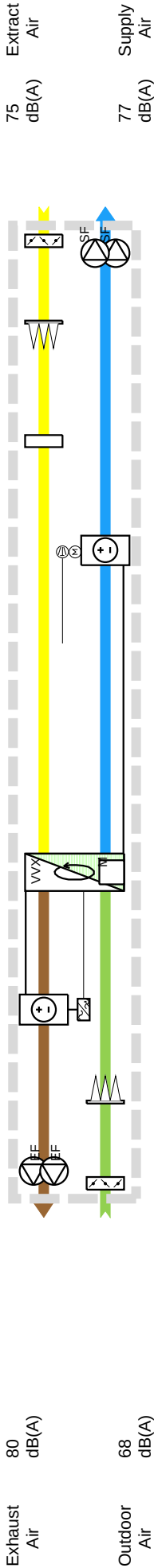


Winter

Temperature after [°C]	-1.6	-1.6	-2.0	-0.3	21.0	21.0	21.0	21.0	21.0
Humidity after [%]	97	97	100	100	40	40	40	40	40
Pressure drop [pa]	0	6	39	75	1	98	1	300	300
Pressure after function [pa]	-	-0	-526	-476	-400	-399	-301	-300	-300
		Efficiency 59.2% (Total Pressure)				F9 - ePM1 90% Filter			

Summer

Temperature after [°C]	39.9	39.9	39.6	28.6	22.0	22.0	22.0	22.0	22.0
Humidity after [%]	14	14	15	27	40	40	40	40	40



Winter

Temperature after [°C]	-5.0	-5.0	-5.0	16.3	19.6	20.0	20.0	20.0	20.0
Humidity after [%]	100	100	100	40	33	32	32	32	32
Pressure drop [pa]	0	1	78	75	28	6	300	300	300
Pressure after function [pa]	-0	-1	-79	-154	-400	300	300	300	300
			F7 - ePM1 60% Filter	82.1/82.1% Wet/dry			Efficiency 60.2% (Total Pressure)		

Summer

Temperature after [°C]	30.0	30.0	30.0	23.4	17.6	18.0	18.0	18.0	18.0
Humidity after [%]	50	50	50	74	95	93	93	93	93
				82.1% wet					



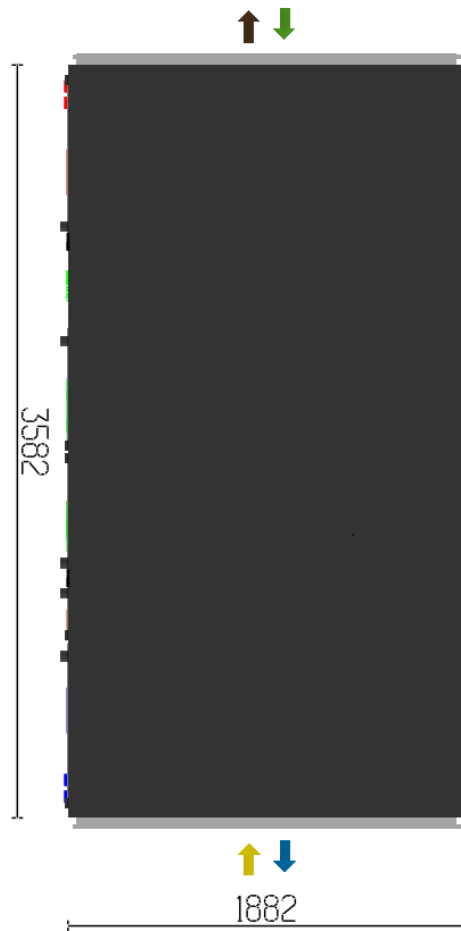
Commissioning Data

	Supply	Extract	Unit
Pressure drop clean filters	39	49	Pa
Fans absorbed power clean filters	1.22	1.33	kW

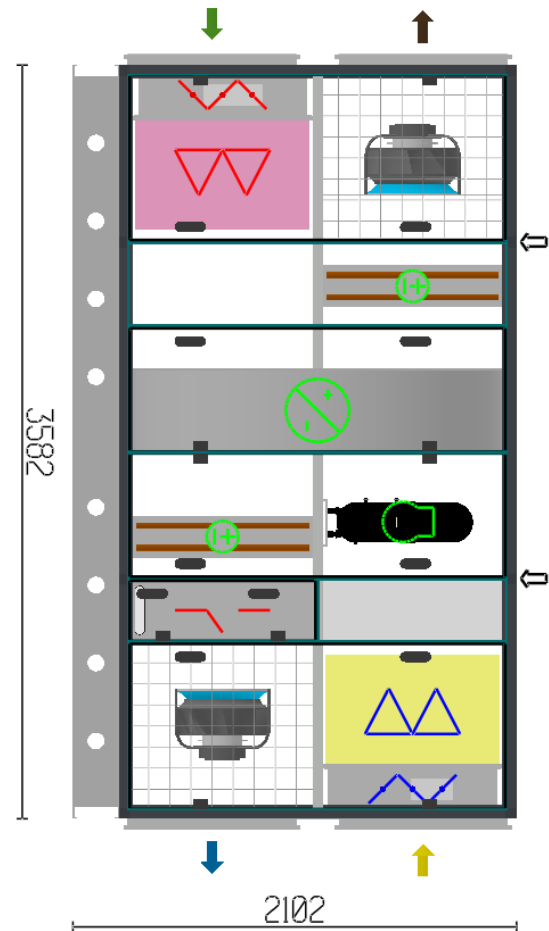
Alternative working points

	Duty	Min...									Average
Airflow, Supply, m³/s	1.70	1.10									1.70
Airflow, Extract, m³/s	1.70	1.10									1.70
External pressure drop, Supply	300	126									
External pressure, Extract	300	126									
SFPv, kW/(m³/s)	1.58	0.84									1.58
SFPe, kW/(m³/s)	1.73	0.93									1.73
Efficiency, Heat exchanger (wet), %	82.1	81.8									82.1
Efficiency, Heat exchanger (dry), %	82.1	81.8									82.1
Reversible heat pump, Absorbed power, Winter, kW	1.9	1.7									1.9
Reversible heat pump, Absorbed power, Summer, kW	3.9	3.0									3.9
Sound data dB(A)											
Supply air	77	67									
Outdoor air	68	57									
Exhaust air	80	75									
Extract air	75	74									
Sound break out	61	54									
Operation hours	3523	0									
Operational hours yearly	3523										

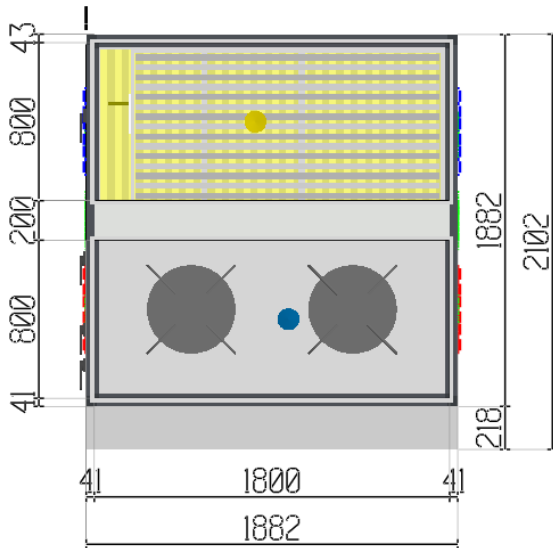
Plan view



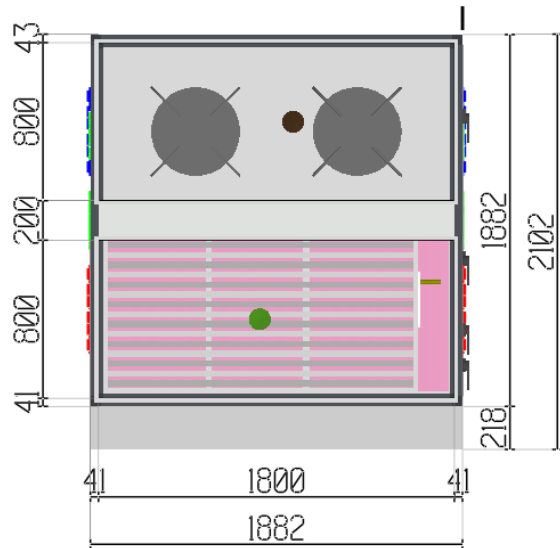
Access side



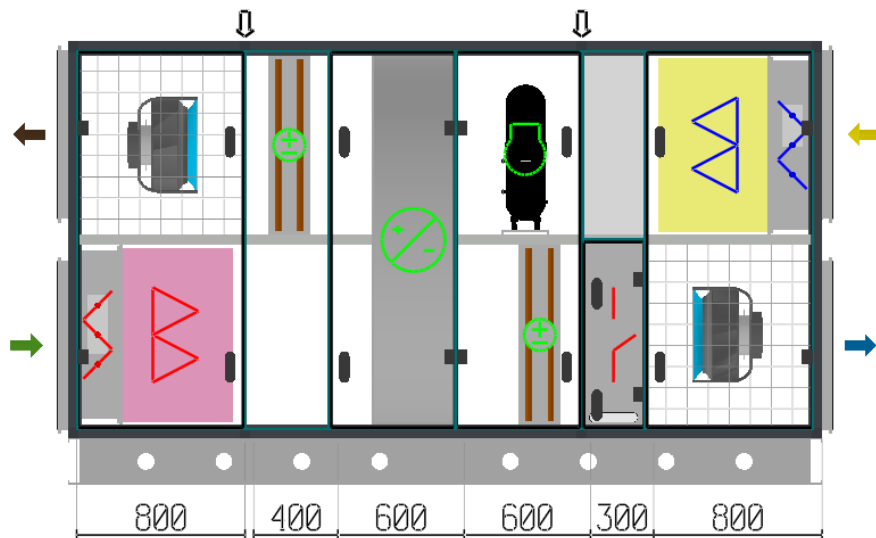
Right end

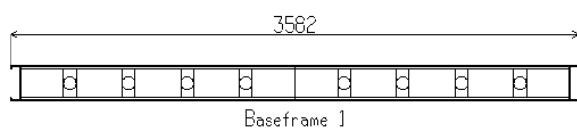
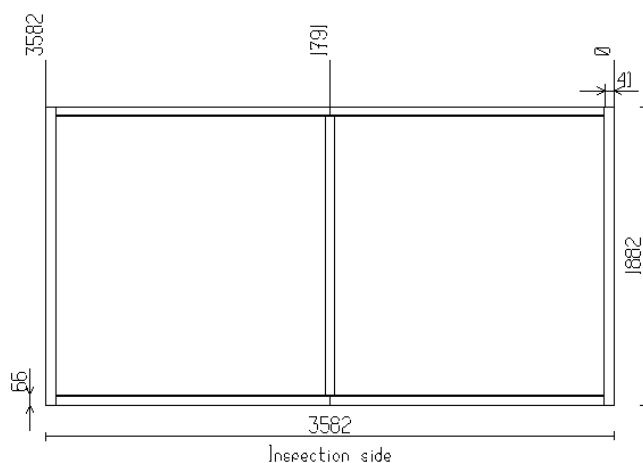


Left end



Doors and panels dimensions





TECHNICAL SUBMITTAL SHEET

Project Name:	Nike – Manchester	Project No:	2479
Originator:	Woodward & Co.	Submission Ref:	05 Rev A
Issued to:	WSP	Date:	27/05/2023
		Description:	S&P

Items for Approval (Description):

Please find attached the following data sheets;

- Jetline Ecowatt 160

Notes: Fan reference added with model highlighted on table.

Please respond by: 17/05/23

Signed: L Westwood

Please select one of the below and provide comments if applicable



Status A – The above item(s) has been reviewed and is accepted. No Comment.	
Status B - The above item(s) has been reviewed and is accepted subject to the following comments:	
Status C – The above item(s) has been rejected for the following reasons:	

Signed: _____

Date: _____

On Behalf of: _____



PROJECT	Nike - Manchester
PROJECT NUMBER	70097489
ISSUE	Stage 4
CHECKED	RS
DATE	01/03/2023
REVISION	T02
SCHEDULE REFERENCE	NRM-WSP-XX-XX-SH-M-500104
	FANS SCHEDULE
COMMENTS	

Filename

CONTENTS OF SPREADSHEET

Sheet 1	COVER
Sheet 2	FANS SCHEDULE

AUTHORISATION OF LATEST VERSION

Type and method of check		
Signatures & dates:	By	R.STEVENS
	Checked	R.STEVENS
	Signed	

REVISIONS					Current Revision	T02
Rev.	Date	By	Checked	Signed	Description	
T01	16/12/22	R.STEVENS	D.BOTTRILL		Stage 3	
T02	01/03/23	R.STEVENS	D.BOTTRILL		Stage 4	

Mechanical Schedules

Schedule title	Fans Schedule	Issue	Stage 4
Schedule ref	NRM-WSP-XX-XX-SH-M-500104	Revision	T02
Project title	Nike - Manchester	Date	01/03/2023
Project no	70097489	Sheet	1 of 1
Specification references		Checked	RS

Fan reference		TEF/00/01			
Number of	No	1 Duty			
Location		Level 01 Toilets / Cleaners store			
System		Toilet Ventilation			
Model		*			

Construction/material					
Fan type		Twin Fan			
Fire rating		n/a			
Max temperature	°C	60			
Casing material		Aluzinc			
Impeller material		*			

Performance					
Air flow rate	l/s	77			
System resistance	Pa	200			

Motor					
Motor Input @ Duty	kW	*			
Motor rating	kW	*			
Full load current	amps	*			
Starting current	amps	*			
No of speeds		Variable			
Speed control		BMS			

Electrical					
Supply	Voltage	volts	230		
	Phase	ph	1		
	Hz	Hz	50		

Specific fan power					
Specific fan power	W/(l/s)	0.4			

Other					
AV mounts		Yes			
Flexible connections		Yes			
Drive guard		*			
Drain plug		*			

Acoustics										
Fan ref	EF-01	Hz	63	125	250	500	1k	2k	4k	8k
Induct Inlet SWL (dBA)			*	*	*	*	*	*	*	*
Induct Outlet SWL (dBA)			*	*	*	*	*	*	*	*

- Notes
- 1 This schedule shall be read in-conjunction with the specification and drawings.
 - 2 Where the final layout, based on the installation drawings, and equipment selections associated with the system varies from the tender documents the installer shall responsible for calculating the final fan resistances.
 - 3 The installer shall ensure the attenuator insertion losses are suitable for the final fan selection to achieve the required noise levels.
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 - 6 Suitable test points shall be provided for air flow measurement.
 - 7 All fans shall be adequately supported independently of ductwork.
 - 8 All fans rated above 1100 W shall be equipped with variable speed drives except smoke exhaust fans.
 - 9 All fans and systems shall comply with the requirements of the Building Regulations
 - 10 Extract Fan to be linked to BMS, Fan to operate continually to provide background ventilation. The fan shall be put into a boost mode once on detection of lighting control within the room (PIR) located within WC's / Cleaners store. TBC by Nike BMS controls specialist
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Range of in-line fans for circular ducts, designed for high aerodynamic performances with a very compact profiles and very low sound levels.

Low profile compact casing manufactured from galvanised sheet steel. The terminal box and the mounting bracket do not increase the product's profile. Optimised design of the impeller, guide vane and outlet diffuser, manufactured from injection-moulded plastic, to increase performance and lower the sound level.

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Motor

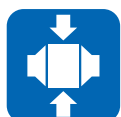
IP65 terminal box allowing outdoor installation.

Fitted with an external rotor brushless EC motor:

- 230V $\pm$ 10% 50/60Hz, IP44.
- 100% speed controllable via internal potentiometer located in the terminal box or via 0-10V external signal.
- Ball bearings and thermal protection with manual reset.
- Working temperature: -20/40 °C

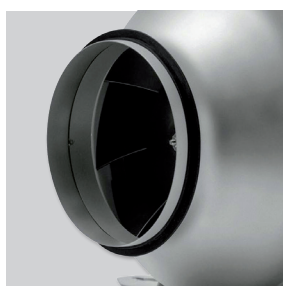


DESIGNED FOR AN
EASY INSTALLATION



Terminal box

Built-in, IP65 terminal box that does not add to the overall height dimensions.



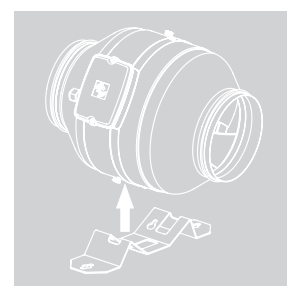
Airtight joints

Rubber gaskets for a more airtight joint with the installation's ducts.



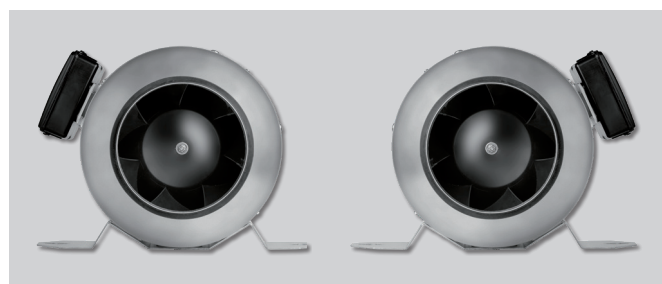
High performance Impeller

New impeller geometry for reduced sound levels and to offer high performance.



Mounting bracket

Strong mounting bracket supplied with the fan.



Two mounting positions for support

The product can be mounted in two different positions by changing the position of the support's anchoring.

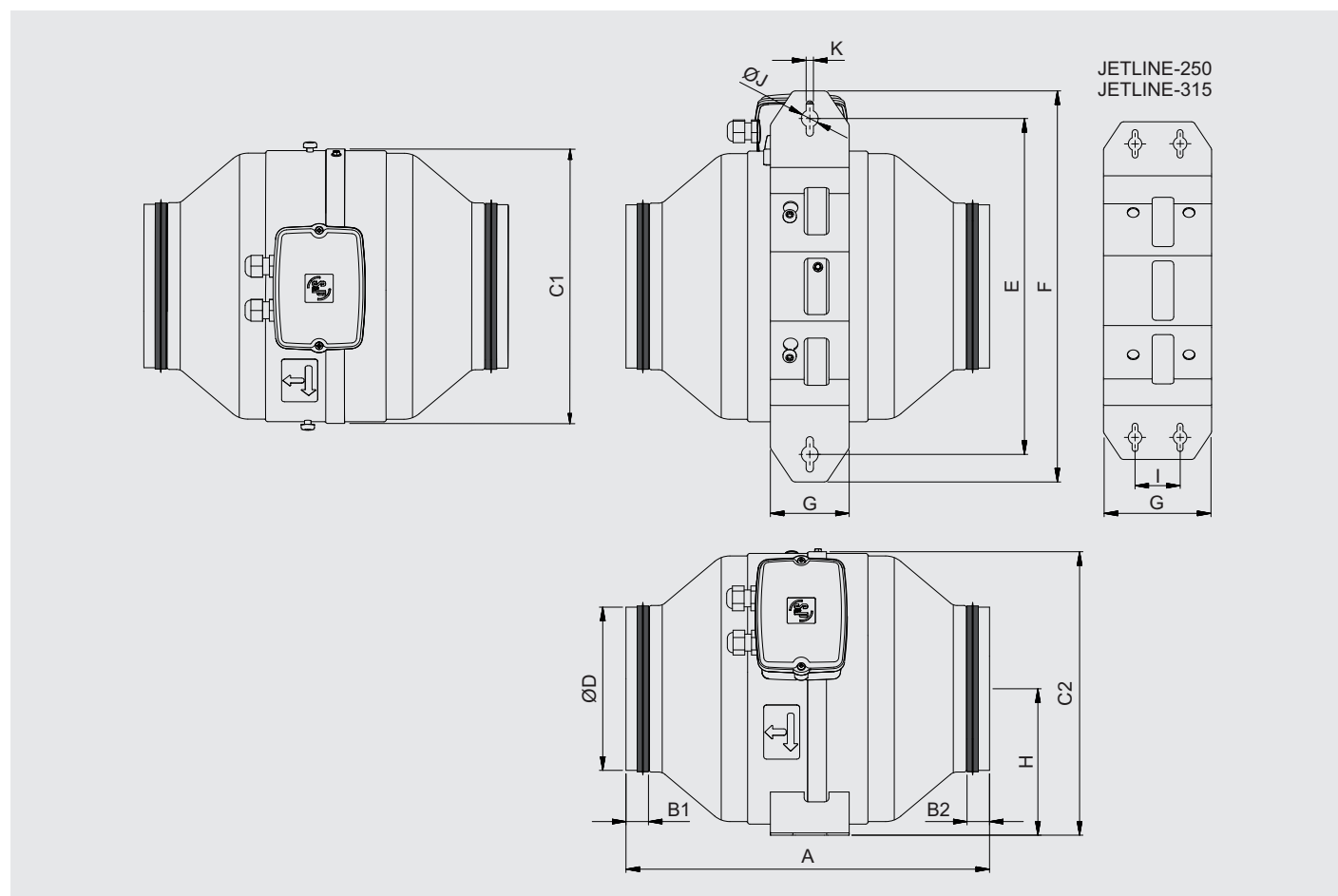
TECHNICAL CHARACTERISTICS

Before installation check that the product electrical characteristics listed on the data plate label (voltage, power, frequency, etc.) match those of the intended electrical supply.

Model	Input tension regul. (V)	Speed (r.p.m.)	Maximum absorbed power (W)	Maximum absorbed current (A)	Maximum airflow (m³/h)	Sound pressure level* (dB(A))			Weight (kg)
						Inlet	Radiated	Outlet	
JETLINE-100 ECOWATT	10	2650	16	0,14	258	40	23	39	2,5
	8	2250	11	0,09	221	37	19	36	
	6	1750	7	0,07	176	31	14	30	
	4	1240	4	0,05	124	24	6	23	
JETLINE-125 ECOWATT	10	2650	26	0,21	393	46	25	46	2,8
	8	2240	17	0,15	330	42	21	43	
	6	1730	9	0,09	256	36	15	37	
	4	1230	5	0,06	192	29	8	30	
JETLINE-150 ECOWATT	10	2650	58	0,46	680	51	32	46	3,6
	8	2260	36	0,29	580	47	29	43	
	6	1740	18	0,16	450	41	37	37	
	4	1240	8	0,09	310	34	16	30	
JETLINE-160 ECOWATT	10	2650	60	0,47	720	50	31	49	3,6
	8	2250	38	0,29	610	47	28	45	
	6	1730	19	0,16	460	41	22	40	
	4	1240	8	0,08	330	33	15	32	
JETLINE-200 ECOWATT	10	2630	109	0,75	1050	59	40	56	4,7
	8	2250	70	0,52	890	55	37	53	
	6	1760	35	0,25	690	50	31	47	
	4	1250	15	0,14	490	42	24	40	
JETLINE-250 ECOWATT	10	2740	135	0,88	1270	57	43	57	5,8
	8	2350	96	0,67	1090	54	40	54	
	6	1830	49	0,35	820	48	35	49	
	4	1290	22	0,17	580	41	27	41	
JETLINE-315 ECOWATT	10	2640	194	1,28	1570	58	42	61	8
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	6	1780	66	0,50	1070	49	33	52	
	4	1260	30	0,24	740	42	26	45	

*Sound pressure level measured at 1,5m in free field conditions, at the duty points 2 - 5 - 8 and 11 of the performance curve.

DIMENSIONS (mm)



Model	A	B1	B2	C1	C2	D	E	F	G	H	I	J	K
JETLINE-100 ECOWATT	276	15	15	181	190	95	256	306	70	98	–	15	6,5
JETLINE-125 ECOWATT	279	15	15	206	214	120	265	315	70	111	–	15	6,5
JETLINE-150 ECOWATT	323	20	20	243,5	252	145	298,5	348	70	130	–	15	6,5
JETLINE-160 ECOWATT	323	20	20	243,5	252	155	298,5	348	70	130	–	15	6,5
JETLINE-200 ECOWATT	322	30	30	273	281	195	320	369	100	144,5	–	15	6,5
JETLINE-250 ECOWATT	329	20	30	293	301	245	326	375	120	154,3	50	15	6,5
JETLINE-315 ECOWATT	369	20	33	322	331	310	357,5	407	120	170	50	15	6,5

TECHNICAL SUBMITTAL SHEET

Project Name:	Nike – Manchester	Project No:	2479
Originator:	Woodward & Co.	Submission Ref:	05 Rev A
Issued to:	WSP	Date:	27/05/2023
		Description:	S&P

Items for Approval (Description):

Please find attached the following data sheets;

- Jetline Ecowatt 160

Notes: Fan reference added with model highlighted on table.

Please respond by: 17/05/23

Signed: L Westwood

Please select one of the below and provide comments if applicable



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Signed: _____

Date: _____

On Behalf of: _____



PROJECT	Nike - Manchester
PROJECT NUMBER	70097489
ISSUE	Stage 4
CHECKED	RS
DATE	01/03/2023
REVISION	T02
SCHEDULE REFERENCE	NRM-WSP-XX-XX-SH-M-500104
	FANS SCHEDULE
COMMENTS	

Filename

CONTENTS OF SPREADSHEET

Sheet 1	COVER
Sheet 2	FANS SCHEDULE

AUTHORISATION OF LATEST VERSION

Type and method of check		
Signatures & dates:	By	R.STEVENS
	Checked	R.STEVENS
	Signed	

REVISIONS					Current Revision	T02
Rev.	Date	By	Checked	Signed	Description	
T01	16/12/22	R.STEVENS	D.BOTTRILL		Stage 3	
T02	01/03/23	R.STEVENS	D.BOTTRILL		Stage 4	

Mechanical Schedules

Schedule title	Fans Schedule	Issue	Stage 4
Schedule ref	NRM-WSP-XX-XX-SH-M-500104	Revision	T02
Project title	Nike - Manchester	Date	01/03/2023
Project no	70097489	Sheet	1 of 1
Specification references		Checked	RS

Fan reference		TEF/00/01			
Number of	No	1 Duty			
Location		Level 01 Toilets / Cleaners store			
System		Toilet Ventilation			
Model		*			

Construction/material					
Fan type		Twin Fan			
Fire rating		n/a			
Max temperature	°C	60			
Casing material		Aluzinc			
Impeller material		*			

Performance					
Air flow rate	l/s	77			
System resistance	Pa	200			

Motor					
Motor Input @ Duty	kW	*			
Motor rating	kW	*			
Full load current	amps	*			
Starting current	amps	*			
No of speeds		Variable			
Speed control		BMS			

Electrical					
Supply	Voltage	volts	230		
	Phase	ph	1		
	Hz	Hz	50		

Specific fan power					
Specific fan power	W/(l/s)	0.4			

Other					
AV mounts		Yes			
Flexible connections		Yes			
Drive guard		*			
Drain plug		*			

Acoustics										
Fan ref	EF-01	Hz	63	125	250	500	1k	2k	4k	8k
Induct Inlet SWL (dBA)			*	*	*	*	*	*	*	*
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Motor

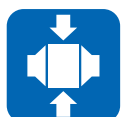
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- Working temperature: -20/40 °C

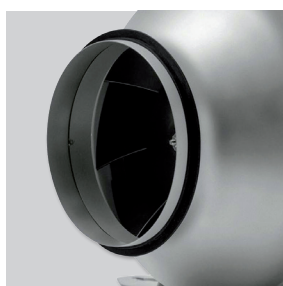


DESIGNED FOR AN
EASY INSTALLATION



Terminal box

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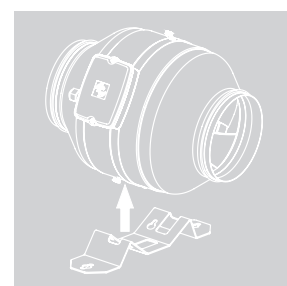
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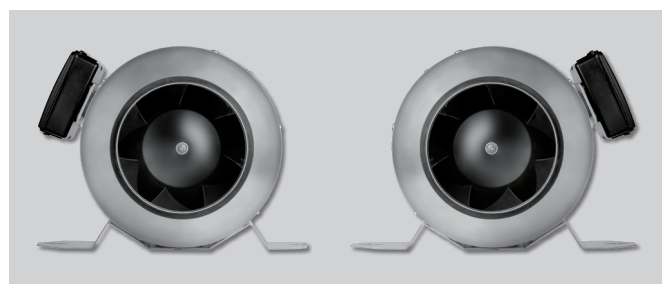
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Strong mounting bracket supplied with the fan.



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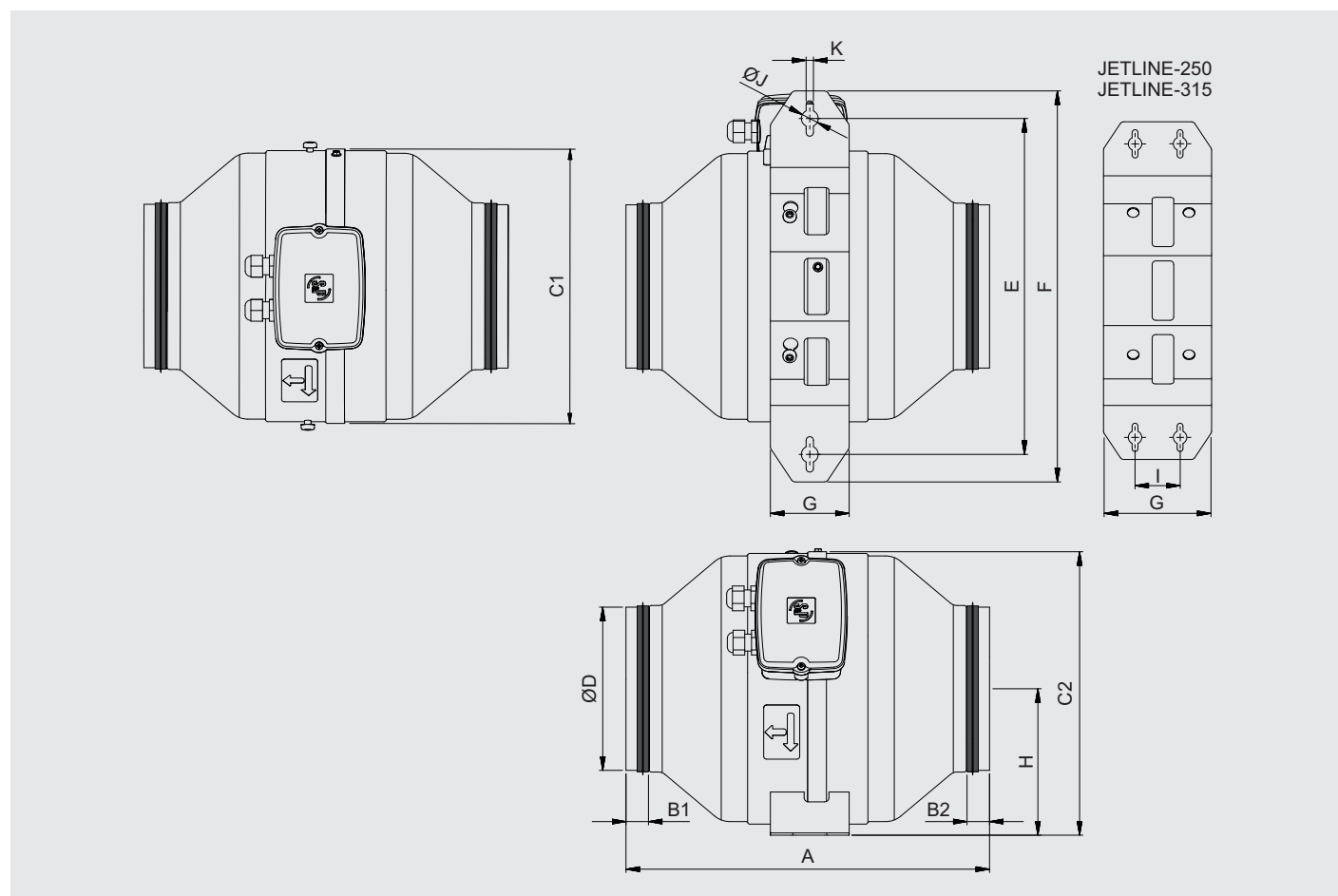
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	6	1750	7	0,07	176	31	14	30	
	4	1240	4	0,05	124	24	6	23	
JETLINE-125 ECOWATT	10	2650	26	0,21	393	46	25	46	2,8
	8	2240	17	0,15	330	42	21	43	
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	6	1730	19	0,16	460	41	22	40	
	4	1240	8	0,08	330	33	15	32	
JETLINE-200 ECOWATT	10	2630	109	0,75	1050	59	40	56	4,7
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	6	1760	35	0,25	690	50	31	47	
	4	1250	15	0,14	490	42	24	40	
JETLINE-250 ECOWATT	10	2740	135	0,88	1270	57	43	57	5,8
	8	2350	96	0,67	1090	54	40	54	
	6	1830	49	0,35	820	48	35	49	
	4	1290	22	0,17	580	41	27	41	
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Attenuator Schedule

Nike Manchester

Schedule Date
15/06/2023
Caice Reference
124496/Q00002

Notes

1. All products shall be supplied by Caice or equal and approved, as per their file reference 124496, contact Kim Grugeon on kim.grugeon@caice.co.uk or call 07825 879022.
2. The Contractor shall order the attenuators scheduled below, and shall send finalised drawings and equipment noise levels to the attenuator supplier to check the selections prior to manufacture.
3. The attenuator supplier shall then undertake acoustic calculations to ensure that the attenuators achieve the specified noise criteria, based upon the finalised information.
4. A Technical Submittal comprising acoustic calculations and a finalised schedule of attenuators shall then be issued to the Consultant for final approval.
5. If an alternative attenuator supplier is proposed then the Contractor shall allow for them to undertake witnessed tests to prove their claimed insertion loss performance in a UKAS accredited BS EN ISO 7235: 2009 test facility, for two sample units. This shall be undertaken prior to order.
6. Pressure losses are stated in accordance with ISO 7235, which is based on laminar airflow conditions. The system designer shall make allowance for increased attenuator pressure losses where turbulent airflow conditions exist on the attenuator entry or exit.
7. Unless stated otherwise all attenuators shall be constructed as follows: Galvanised sheet steel casings with 30mm profile flanges that are fully compliant with DW/TM1 at a high pressure rating (+2000/-750Pa). Profile flanges shall be compatible with Doby, Mez & Metu flanging systems. Elements shall be installed in the vertical plane, with side elements provided as standard, and all elements shall have aerodynamic inlet and outlet fairings. Element facings shall be constructed from expanded galvanised steel mesh with fibre glass tissue bonded to the inner face. Mineral wool infill shall be overpacked to minimise voids due to settlement. Attenuator ends shall be protectively wrapped, and all attenuators shall be delivered to site on pallets and individually labelled.

Product Reference	Product Description	Product Code	Dimensions (mm)			Insertion Loss (dB)								Vol (m³/s)	PL (Pa)	Qty	Noise Criteria	Features
			W	H	L	63	125	250	500	1k	2k	4k	8k					
ATT/00/01	TEF/00/01 Extract duct	Rectangular LG01H/3C/L/S	280	205	600	4	7	13	16	31	51	55	55	0.08	17	1	-	Rectangular attenuator & Horizontal elements
ATT/00/02	TEF/00/01 Extract duct	Rectangular LG01H/3C/L/S	280	205	900	4	8	18	25	43	55	55	55	0.08	19	1	-	Rectangular attenuator & Horizontal elements
ATT/00/03	AHU/01 Intake duct Atmosphere side	Rectangular LG01H/3C/L/S	950	550	900	3	4	9	15	15	12	10	6	1.70	10	1	dB(A)45 at 10m	Rectangular attenuator & Horizontal elements
ATT/00/04	AHU/01 Exhaust duct Atmosphere side	Rectangular SG01V/3C/L/S	900	550	900	4	4	9	18	15	12	13	14	1.70	10	1	dB(A)45 at 10m	Rectangular attenuator
ATT/00/05	AHU/01 Supply duct Room side	Rectangular LG01H/3C/L/S	950	550	900	4	8	13	20	21	15	12	8	1.70	17	1	NR35 at 1.5m	Rectangular attenuator & Horizontal elements
ATT/00/06	AHU/01 Extract duct Room side	Rectangular SG01H/3C/L/S	900	550	600	4	7	14	18	15	14	13	12	1.70	22	1	NR35 at 1.5m	Rectangular attenuator & Horizontal elements

Attenuator Flow Generated Sound Power Level Schedule

Nike Manchester

Schedule Date
15/11/2023
Caice Reference
124496/Q00002

Product Reference	Product Description	Product Code	Dimensions (mm)			Flow Generated Sound Power Level (dB)						Vol (m³/s)	PL (Pa)	Quantity	Features
			W	H	L	63	125	250	500	1k	2k	4k	8k		
ATT/00/01	TEF/00/01 Extract duct	Rectangular LG01H/3C/L/S	280	205	600	33	30	23	20	19	17	13	8	1	Rectangular attenuator & Horizontal elements
ATT/00/02	TEF/00/01 Extract duct	Rectangular LG01H/3C/L/S	280	205	900	33	30	23	20	19	17	13	8	1	Rectangular attenuator & Horizontal elements
ATT/00/03	AHU/01 Intake duct Atmosphere side	Rectangular LG01H/3C/L/S	950	550	900	41	38	31	28	27	25	21	16	1	Rectangular attenuator & Horizontal elements
ATT/00/04	AHU/01 Exhaust duct Atmosphere side	Rectangular SG01V/3C/L/S	900	550	900	45	43	37	37	35	30	21	11	1	Rectangular attenuator
ATT/00/05	AHU/01 Supply duct Room side	Rectangular LG01H/3C/L/S	950	550	900	46	43	36	33	32	30	26	21	1	Rectangular attenuator & Horizontal elements
ATT/00/06	AHU/01 Extract duct Room side	Rectangular SG01H/3C/L/S	900	550	600	54	52	46	46	44	39	30	20	1	Rectangular attenuator & Horizontal elements

Pressure drops in accordance with BS EN ISO 7235:2009



Appendix F: Acoustic calculations.

Condensers

	REYQ14U	REYQ12U	ZAG71MV1
Lp, 1m	60	61	42
Distance to residential	26	26	27
Distance correction (from Lp,1m)	-28	-28	-29
No. units	1	2	2
No. units correction	0	3	3
Intermittency correction	3	3	3
Lp, residential	35	39	19
Lp, residential condenser total	40		

WC fan

	WC fan
Lp,1.5m, open exhaust	49
Distance to residential	32
Distance correction (from Lp,1.5m)	-27
No. units	1
No. units correction	0
Lp, residential WC fan	22
<i>Noise level will be quieter in reality due to installation of attenuator to the exhaust</i>	

AHU

	AHU01
Lw	61
Distance to residential	26
Distance correction (from Lw)	-36
No. units	1
No. units correction	0
Lp, residential	25

AHU - in-duct

<i>Typical spectrum, assumed</i>	86	85	83	84	88	83	82	77	91
Lw, discharge	75	74	72	73	77	72	71	66	80
Attenuator, IL	4	4	9	18	15	12	13	14	
Lw, attenuated	71	70	63	55	62	60	58	52	67
Lw, regen	45	43	37	37	35	30	21	11	
Lw, after attenuator	71	70	63	55	62	60	58	52	67
Distance to residential	25								
Distance correction (from Lw)	-36								
Lp, residential	35	34	27	19	26	24	22	16	31
Lw, fresh air	63	62	60	61	65	60	59	54	68
Attenuator, IL	3	4	9	15	15	12	10	6	
Lw, attenuated	60	58	51	46	50	48	49	48	56
Lw, regen	41	38	31	28	27	25	21	16	
Lw, after attenuator	60	58	51	46	50	48	49	48	56
Distance to residential	25								
Distance correction (from Lw)	-36								
Lp, residential	24	22	15	10	14	12	13	12	20
Lp, total AHU total	32								

Lp, residential all plant total **41**



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