

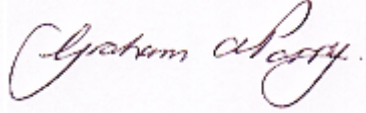
Report for:

Macniven Quays Ltd

The Maltings, Fobney Street, Reading
Noise Impact Assessment

Status: Final

Date: 13.05.2021

Author	 Mike Ledbetter Acoustic Consultant
Reviewed and Approved By	 Graham Parry Managing Director
Report For	Martin Baker Macniven Quays Ltd Calpe House 7A St Thomas Street Winchester Hampshire SO23 9HE
Date	13.05.2021
Version Number	A4257/N/001
Status	Final

This report has been prepared by ACCON UK Limited with all reasonable care and diligence within the terms of the contract with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. We accept no responsibility to third parties to whom this report, or any part, thereof is made available. Any such party relies upon the report at their own risk.

CONTENTS

1. INTRODUCTION	4
2. THE NATURE, MEASUREMENT AND EFFECT OF NOISE.....	6
3. NOISE ASSESSMENT CRITERIA	7
3.1. British Standard 4142:2014	7
4. NOISE MEASUREMENT SURVEY	10
5. BS 4142 ASSESSMENT	12
5.1. Specific Sound Level	12
5.2. Initial Assessment.....	13
6. CONCLUSION.....	15

LIST OF TABLES

Table 2.1: Typical Noise Levels.....	6
Table 4.1: Summary of Free-Field Noise Levels at MP1.....	11
Table 5.1: Plant Noise Levels	12
Table 5.2: BS 4142 Assessment	14

LIST OF FIGURES

Figure 1.1: Location Plan.....	5
Figure 4.1: Noise Measurement Position	10
Figure 5.1: Proposed Barrier Location.....	13
Figure 5.2: Cycle Storage Area	13

LIST OF APPENDICES

Appendix 1 Glossary of Acoustic Terminology	17
Appendix 2 Summary of Noise Measurements	19
Appendix 3 Plant Specification	21

1. INTRODUCTION

ACCON UK Limited (ACCON) has been commissioned by Macniven Quays Ltd to carry out a noise assessment in order to determine the impact of noise on nearby residential receptors from the proposed air conditioning plant at The Maltings, Fobney Street, Reading.

ACCON previously carried out a noise assessment (ACCON Report: A3604, Date 01.04.2019) for a change of use application for The Maltings which was granted planning permission by Reading Borough Council (RBC) on 18th June 2019 (Planning Reference: 190619).

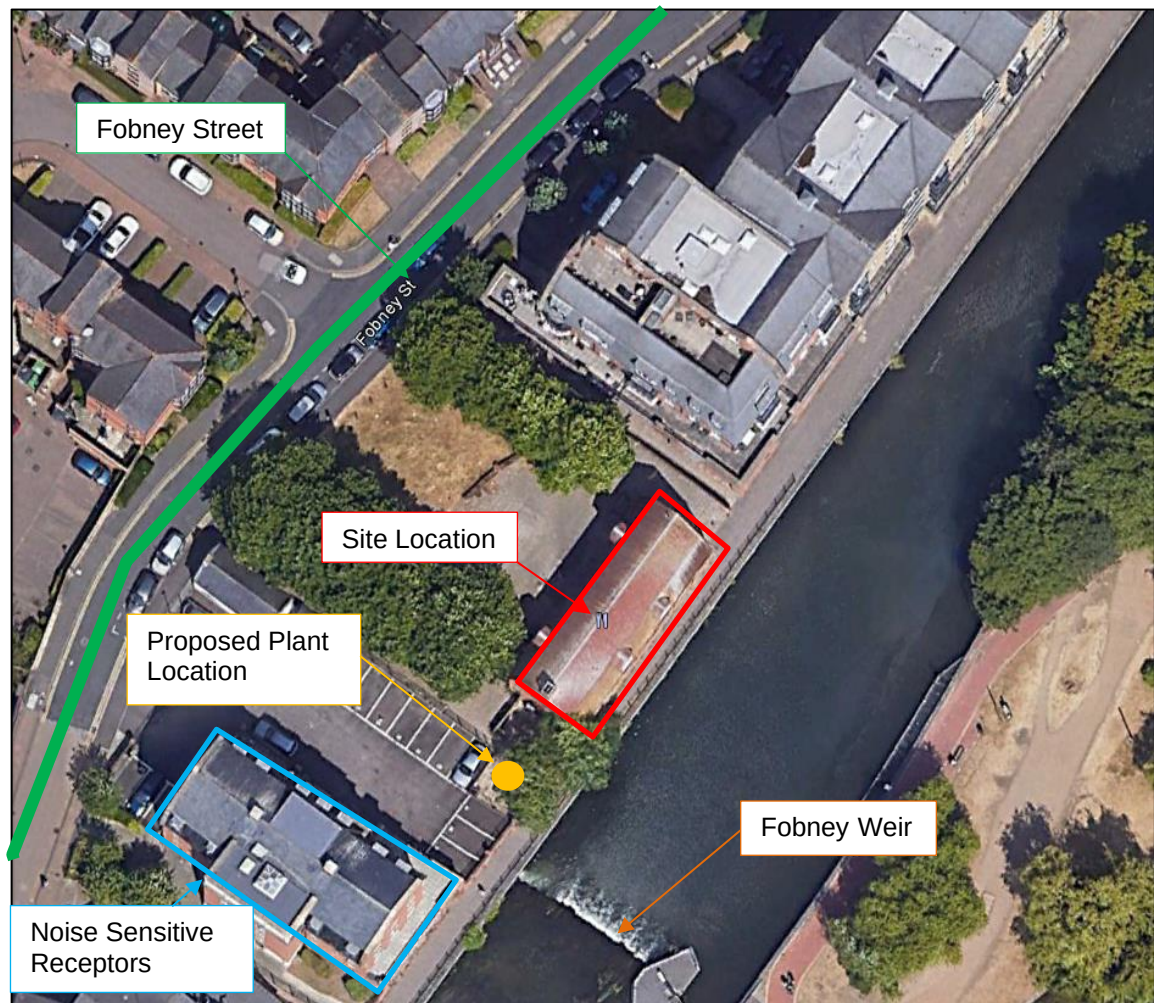
Condition 9 of that permission stated:

The specific sound level of the plant/equipment hereby approved, LA_{eqr,Tr} as measured at a point 1 metre external to sensitive facades, shall be at least 10dB below the existing background sound level, LA_{90,T} when all plant/equipment (or any part of it) is in operation. The noise rating level of the plant/equipment hereby approved, LA_{eqr,Tr} (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades, shall not exceed the existing background sound level, LA_{90,T} when all plant/equipment (or any part of it) is in operation.

The assessment is required in order to quantify the impact of noise from the proposed air conditioning system. The existing cycle storage facility would be utilised for the air conditioning plant.

A noise measurement survey has previously been carried out in order to determine the background noise climate in the vicinity of the nearest noise sensitive receptors. A site location plan is shown in **Figure 1.1**.

Figure 1.1: Location Plan



2. THE NATURE, MEASUREMENT AND EFFECT OF NOISE

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to characterise the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels, for example from 60 dB(A) to 70 dB(A), would represent a doubling in 'loudness'. Similarly, a 10 dB(A) decrease in noise, for example from 70 dB(A) to 60 dB(A), would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible¹. **Table 2.1** provides typical noise levels of common sources.

Table 2.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

A Glossary of Acoustic Terminology is provided in **Appendix 1**.

¹ Institute of Environmental Management and Assessment (2014). Guidelines for environmental noise impact assessment.

3. NOISE ASSESSMENT CRITERIA

3.1. British Standard 4142:2014

BS 4142 *Methods for rating and assessing industrial and commercial sound* provides a method for the measurement and rating of industrial type noise sources and background noise levels outside dwellings. The rating level (defined in the BS) is used to rate the noise level of the source (this is defined as the 'specific sound level') outside residential dwellings.

The rating level is determined by assessing the character of the noise and applying an acoustic feature correction, if appropriate, to the specific sound level. Corrections are applied for the tonality, impulsivity and intermittency of the noise source which can all increase the impact of noise.

The initial assessment described in BS 4142 to determine whether an adverse impact is likely is based on establishing the difference between the rating level and the background noise level outside the residential property of interest. The British Standard states that the following points should be considered:

- *"Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

Where it is considered that the initial assessment of the impact needs to be modified due to the context in which the noise is occurring, BS 4142 suggests that all pertinent factors are taken into consideration, including:

- 1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound² levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

- 2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*
- 3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
 - i. facade insulation treatment;*
 - ii. ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
 - iii. acoustic screening.*

There is also a requirement within BS 4142:2014 to consider the uncertainty in the measurement and assessment procedure and it is stated that *“The level of uncertainty associated with a measurement of sound level depends upon a number of factors, including:*

- a. the complexity of the sound source and the level of variability in sound emission from the source;*
- b. the complexity and level of variability of the residual acoustic environment;*
- c. the level of residual sound in the presence of the specific sound at the measurement location;*
- d. the location(s) selected for taking the measurements;*
- e. the distance between sources of sound and the measurement location and intervening ground conditions;*
- f. the number of measurements taken;*
- g. the measurement time intervals;*
- h. the range of times when the measurements have been taken;*

² The residual sound is defined as the ambient sound level at the assessment location in the absence of the specific sound source

- i. the range of suitable weather conditions during which measurements have been taken;*
- j. the measurement method and variability between different practitioners in the way the method is applied;*
- k. the level of rounding of each measurement recorded; and*
- l. the instrumentation used.”*

4. NOISE MEASUREMENT SURVEY

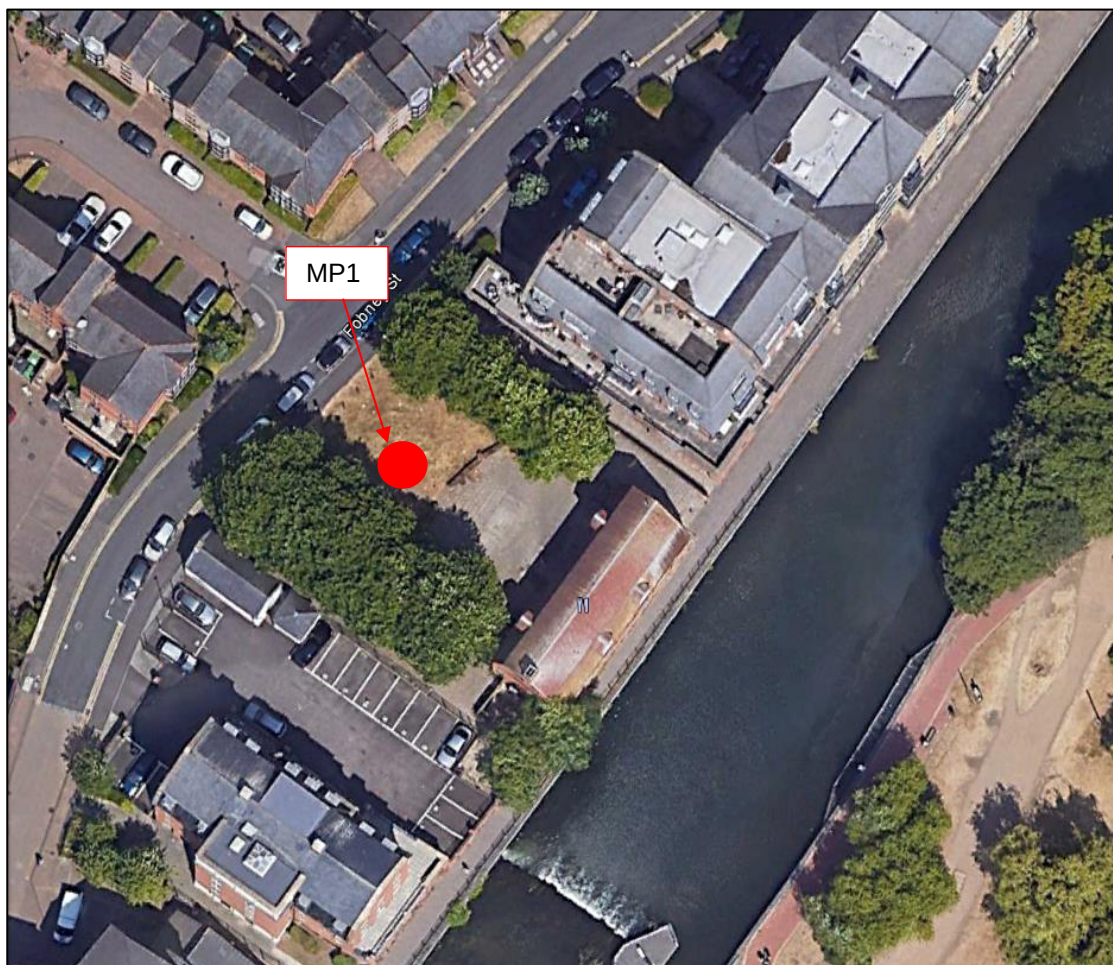
A noise measurement survey has previously been carried out at the site in order to determine the typical background sound levels ($L_{A90, T}$) at the nearest residential receptors to the proposed location of the air conditioning plant.

Noise Monitoring Position 1 (MP1) was located on the grass area between the consented change of use development and Fobney Street. The noise measurements were carried out between 1000 hrs and 1100 hrs and between 1700 hrs and 1800 hrs on Tuesday 19th March 2018 in order to capture those periods when the proposed plant is likely to be operational. The microphone was mounted on a tripod at a height of approximately 1.5 m above the ground level. This position is considered to be representative of the nearest noise sensitive receptors to the site.

The noise climate at MP1 was dominated by road traffic on Fobney Street with road traffic on other local roads such as the elevated Inner Distribution Road to the south east which was also audible. Noise from the Fobney Weir was occasionally audible when road traffic sources were reduced although this will clearly depend on the time of year and the amount of water flowing over the weir.

The measurement position is identified in **Figure 4.1**.

Figure 4.1: Noise Measurement Position



The noise measurement study utilised a Norsonic 118 Class 1 Sound Level Meter which has a current certificate of calibration. Before and after the measurement period, the equipment was calibrated in order to ensure that the equipment had remained within reasonable calibration limits (± 0.5 dB).

The weather conditions recorded during the noise measurements on Tuesday 19th March were dry with 100% cloud cover, and a temperature of approximately 10°C. There was a wind speed of less than 1 m/s.

The noise levels measured at MP1 are summarised in **Table 4.1**. Detailed noise measurement results are identified in **Appendix 2**.

Table 4.1: Summary of Free-Field Noise Levels at MP1

Period (Hours)	$L_{Aeq, T}$ (dB)	Average $L_{A90, 5min}$ (dB)	Typical $L_{A90, 5min}$ (dB)
1000 – 1100	57	51	51
1700 – 1800	55	51	51

Note: The noise measurements were carried out over consecutive five minute periods. The $L_{Aeq, T}$ was subsequently logarithmically averaged over the time periods indicated in **Table 4.1**, the Average $L_{A90, T}$ were arithmetically averaged. The Typical $L_{A90, T}$ is the most commonly occurring $L_{A90, 5min}$ during the specific period.

5. BS 4142 ASSESSMENT

5.1. Specific Sound Level

In order to determine the impact of the proposed plant it is necessary to determine the specific noise level at the nearest noise sensitive receptor. This receptor is located 13.5m from the proposed plant location. **Table 5.1** identifies the sound pressure level of the proposed plant at the receptor location. The specification for the plant can be found in **Appendix 3**.

Table 5.1: Plant Noise Levels

Plant Unit	Sound Power Level (dB)	Sound Pressure Level at Receptor at 13.5m distance (dB)
Toshiba RAV-GM2241AT8-E	76	45
Toshiba RAV-GM2241AT8-E	76	45
Toshiba RAV-GM1401AT8P-E	74	43
Total Combined Plant	-	50

Table 5.1 identifies that the total sound pressure level at the nearest noise sensitive receptor would be 50 dB. An assessment of this specific sound level and an appropriate acoustic feature correction would in all likelihood indicate an adverse impact, therefore it is necessary to identify appropriate mitigation measures to reduce the overall sound level. Adding an environmental noise barrier to the rear and sides of the proposed plant area within the cycle store as identified in **Figure 5.1** and **Figure 5.2** would reduce the specific sound level at the nearest noise sensitive receptor by 10 dB. The barrier should be of 1.8m height such that there is not line of sight between the plant and the sensitive receptors and have a surface density of at least 15kg/m². The cycle storage area benefits from a single skin corrugated profile metal roof.

Figure 5.1: Proposed Barrier Location



Figure 5.2: Cycle Storage Area



5.2. Initial Assessment

Table 5.2 identifies the BS 4142 assessment that has been carried out in order to determine the impact that the proposed plant will have on the nearest noise sensitive receptor. This assessment assumes a very worst case in which the plant is running constantly for the identified operational hours and that the plant is approximately 13.5 m from the nearest noise sensitive receptor. It is also assumed that the barrier identified in **Figure 5.1** has been constructed. The location of the nearest noise sensitive receptor is identified in **Figure 1.1**.

Table 5.2: BS 4142 Assessment

Results	Noise Level at the Nearest Noise Sensitive Receptor (dB)	Relevant Clauses of BS 4142:2014	Commentary
Background Sound Level $L_{A90,T}$ (dB)	51	8.1, 8.2	A typical background sound level during the daytime period.
Specific Sound Level $L_{Aeq,1hr}$ (dB)	40	7.3	The specific sound level as identified in order to achieve RBC's requirement that the specific sound level should be at least 10 dB below the existing background sound level ($L_{A90,T}$)
Acoustic Feature Correction (dB)	+2	9.1, 9.2, 9.3	The plant is likely to have tonal component considered to be just perceptible at the closest receptor.
Rating Sound Level $L_{Aeq,1hr}$ (dB)	42	9.1	
Excess of Rating Sound Level over Background Sound Level	-9		Indication of a low impact

The assessment of the existing noise levels from the proposed plant area in **Table 5.1**, identifies that when assessed in line with the methodologies in BS 4142, the proposed plant would have an indication of a low impact. It should also be noted that previously the background noise measurements were obtained in a partially shielded location whereas background noise levels at the closest residential receptor would be more exposed to noise from the Inner Distribution Road and slip road and as such would be higher to the extent that the assessment in **Table 5.2** is considered to be a worst case.

6. CONCLUSION

A noise assessment has been carried out to assess noise from the air conditioning plant of the proposed offices at The Maltings, Fobney Street, Reading.

An assessment of the sound from the proposed plant has been undertaken with regard to the methodology in BS 4142 and measured background sound levels. The assessment has identified mitigation measures that would ensure that the proposed plant would have noise levels such that there would be an indication of a low impact.

APPENDICES

Appendix 1

Glossary of Acoustic Terminology

Term	Description
'A'-Weighting	This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.
Decibel (dB)	This is a tenth (deci) of a bel. A decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.
$L_{Aeq,T}$ (Ambient /Period Sound Level)	The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location. $L_{Aeq,T}$ can be measured directly with an integrating sound level meter.
$L_{A90,T}$ (Background Sound Level)	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time. The $L_{A90,T}$ is used to describe the background noise levels at a particular location.
L_{Amax}	The 'A'-weighted maximum sound pressure level measured over a measurement period.
Rating Level, $L_{Ar,Tr}$	The specific sound level plus any adjustment for the characteristic features of the sound.
Residual Sound Level, $L_r = L_{Aeq,T}$	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Specific Sound Level, $L_s = L_{Aeq,Tr}$	The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr .
Sound Power Level	The total sound energy radiated by a sound source in all directions. In decibels with a reference level of 1×10^{-12} Watts

Appendix 2

Summary of Noise Measurements

Time	L _{Aeq}	L _{AF(max)}	L _{A10}	L _{A90}
1000 – 1005	58	71	61	52
1005 – 1010	59	72	62	51
1010 – 1015	58	72	60	52
1015 – 1020	58	70	60	53
1020 – 1025	60	78	62	52
1025 – 1030	55	67	57	51
1030 – 1035	55	70	57	50
1035 – 1040	55	64	58	51
1040 – 1045	56	73	57	50
1045 – 1050	57	72	58	50
1050 – 1055	55	67	58	50
1055 – 1100	56	65	58	51
1000 – 1100	57	78	59	51
1705 – 1710	57	73	58	52
1710 – 1715	56	67	58	51
1715 – 1720	55	66	57	52
1720 – 1725	55	63	57	51
1725 – 1730	54	62	56	51
1730 – 1735	56	71	56	51
1735 – 1740	55	71	56	51
1740 – 1745	57	71	58	51
1745 – 1750	54	67	56	51
1750 – 1755	56	70	58	51
1755 – 1800	57	76	58	50
1800 – 1805	55	61	57	50
1705 – 1805	55	76	57	51

Appendix 3 Plant Specification

TOSHIBA Leading Innovation >>>

Toshiba Air Conditioning - RAV-GM Data Sheet

RAV-GM1401AT8P-E Outdoor Unit

Features

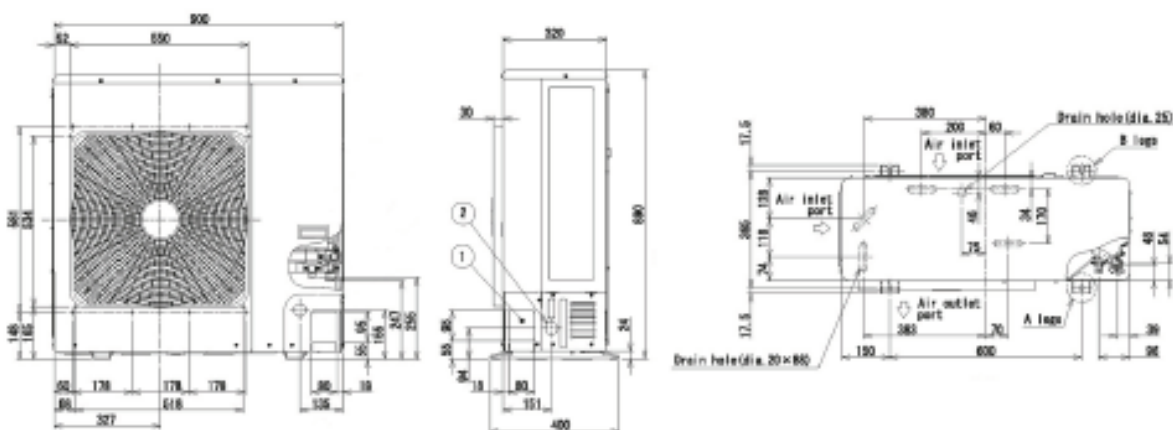
- Redesigned for use with refrigerant R32
- Wide operating range (cooling mode -15°C to +46°C)
- Auto-diagnostic function
- Flexible, can be utilised for single, twin, triple and quad indoor applications
- Compact size



Technical Data

Model reference			RAV-GM1401AT8P-E
Nominal	Cooling Capacity	kW	12.0
	Heating Capacity	kW	12.8
Operating Range	Cooling/Heating	°C	-15 to 46/-15 to 15
Air Flow	High	m³/h - l/s	4200 - 1167
Sound	Pressure High Cooling/Heating	dB(A)	55/57
	Power High Cooling/Heating	dB(A)	70/74
Unit	Height x Width x Depth	mm	890 x 900 x 320
	Weight	kg	69
Pipe Connection	Flare Connections (gas - liquid)	inch	5/8 - 3/8
	Min. -Max. Length	m	5-50
	Maximum Height Difference	m	±30
	Drain Port Connection	mm	16
Refrigerant R32	Base Charge/Chargeless Length	kg/m	2.1/30
	Additional Charge Liquid Side	g/m	35
Run Current	Maximum	A	7.15
Power Cable	Outdoor to Indoor		3 core + earth
Power Supply	Suggested Fuse Size	V/ph/Hz-A	380-415/3/50-16

Dimensional Drawings



Cool Designs Ltd

Raising the Standards in Air Conditioning Distribution

www.cdiweb.info



All UK duties are based on Cooling Indoor air temperature 22°C DB/16°C WB Outdoor air temperature 28°C DB 50% RH, high fan speed, 5 m pipe run.
Heating Indoor air temperature 20°C DB Outdoor air temperature -5°C DB 100% RH, high fan speed, 5 m pipe run. Values are based on the maximum compressor output.
Data obtained from Toshiba Air Conditioning Published Data July 2018.

13.05.2021

Page | 22

Email: enquiry@accon-uk.com • www.accon-uk.com
Unit B, Fronds Park, Frouds Lane, Aldermaston, Reading, RG7 4LH
Reading Office: 0118 971 0000
Brighton Office: 01273 573 814

TOSHIBA Leading Innovation >>>

Toshiba Air Conditioning - RAV-GM Data Sheet

RAV-GM2241AT8-E Outdoor Unit

Features

- Redesigned for use with refrigerant R32
- New compressor design
- Reduced refrigerant charge - 5 kg
- Flexible, can be utilised for twin, triple and quad indoor applications
- Compact size

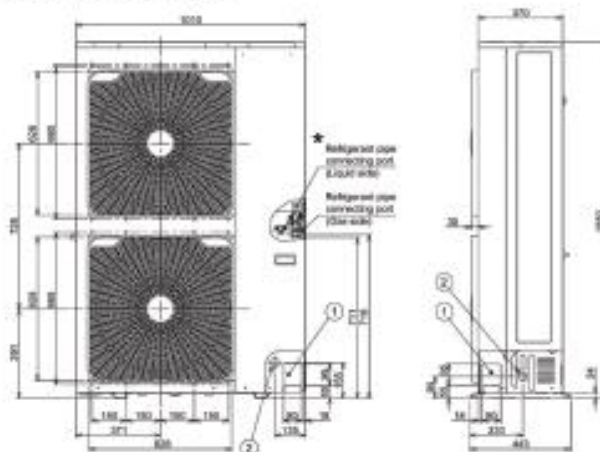


Technical Data

Model reference		RAV-GM2241AT8-E
Nominal cooling	kW	19.0
Nominal heating	kW	22.4
Maximum air flow	m³/h	9150
Maximum air flow	l/s	2541
Sound power (cool/heat)	dB(A)	76/76
Sound pressure (cool/heat)	dB(A)	58/60
Dimensions (H x W x D)	mm	1550 x 1010 x 370
Unit weight	kg	142
Power supply	V-ph-Hz	380/415-3-50
Interconnecting cable		3 core + earth
Suggested fuse size	A	16
Maximum operating current (cooling)	A	-*
Operating range, cooling	°C	-15 to 46
Operating range, heating	°C	-27 to 15
Pipe sizes (liquid - suction)	inch	1/2 - 1-1/8
Minimum/maximum pipe length	m	5/60
Maximum height difference	m	30
Pre-charge pipe length	m	30

* Waiting for published data

Dimensional Drawings



Cool Designs Ltd

Raising the Standards in Air Conditioning Distribution

www.cdiweb.info



All UK duties are based on Cooling Indoor air temperature 22°C DB/16°C WB Outdoor air temperature 28°C DB 50% RH, high fan speed, 5 m pipe run.
Heating Indoor air temperature 20°C DB Outdoor air temperature -5°C DB 100% RH, high fan speed, 5 m pipe run. Values are based on the maximum compressor output.
Data obtained from Toshiba Air Conditioning Published Data September 2019.

13.05.2021

Page | 23

Email: enquiry@accon-uk.com • www.accon-uk.com
Unit B, Fronds Park, Frouds Lane, Aldermaston, Reading, RG7 4LH
Reading Office: 0118 971 0000
Brighton Office: 01273 573 814



Email: enquiry@accon-uk.com

Reading Office:

Unit B, Fronds Park,
Frouds Lane, Aldermaston,
Reading, RG7 4LH
Tel: 0118 971 0000 Fax: 0118 971 2272

Brighton Office:

Citibase, 95 Ditchling Road,
Brighton, East Sussex, BN1 4ST
Tel: 01273 573 814

www.accon-uk.com