

Sound Licensing Ltd.
Suite 4, Broxbourne Business Centre
New River Trading Estate
Cheshunt
Herts EN8 0NL

T: +44 (0) 20 7096 1555
www.soundlicensing.co.uk
enquiries@soundlicensing.co.uk

NOISE MITIGATION REPORT – AIR SOURCE HEAT PUMP

10 BIRCH GREEN, READING RG2 8HS

FOR

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AUTHOR: L ANKERS, MIOA
CHECKED: M LAUEZZARI, MIOA MIOL
APPROVED: M LAUEZZARI, MIOA MIOL

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The preparation of this report by Sound Licensing Ltd. has been undertaken within the terms of the proposal using all reasonable skill and care. Sound Licensing Ltd accepts no responsibility for the data provided by other bodies and no legal liability arising from the use by other persons of data or opinions contained in this report.

1. EXECUTIVE SUMMARY

The Client intends to seek planning approval for the installation of an air source heat pump to service the premises at 10 Birch Green, Reading RG2 8HS.

The client has completed an MCS 020 assessment which demonstrates that the air source heat pump will not meet the required noise level in accordance with the standard.

Sound Licensing has undertaken a desktop noise assessment in order to determine the required mitigation level to comply with the MCS 020 Planning Standard at the nearest noise sensitive properties, which have been identified as the residential premises directly above the site at 9 Birch Green, RG2.

Noise calculations of the mechanical plant have been undertaken using all available details and plans provided by the client and obtaining manufacturers' specifications wherever possible. The data and information form the basis of the assessment.

The predicted noise level from the proposed air source heat pump, with the recommended noise mitigation installed, complies with the MCS 020 Planning Standard.

2. NOISE LEVEL PREDICTIONS

This section presents calculations to predict the noise impact of the proposed air source heat pump, located at the site, at the nearest noise sensitive properties.

The nearest sensitive residential receptor was noted to be the first-floor window located on the rear façade of 9 Birch Green at an approximate distance of 3m from the proposed air source heat pump.

The proposed air source heat pump is a Daikin Altherma Monobloc 4kW with a sound power level of 58dB(A).

Due to the proposed location of the mechanical plant, there will be 2 reflective façades around the proposed mechanical plant, therefore a correction for façade reflections (+3dB) has been applied.

The noise level at the 1st floor window, with the mechanical plant operating, is predicted to be **44dB L_{Aeq,T}** which is **2dB(A) above** the MCS 020 acceptable noise level (42dB(A)). Full calculations can be found in Appendix C.

In order to meet the acceptable noise level, additional noise mitigation is required.

3. RECOMMENDED NOISE MITIGATION

It is recommended to install a permanent partial enclosure around the air source heat pump. The enclosure should be installed above and on either side of the unit. The enclosure should be constructed of a solid material (minimum mass of 11kg/m^2) with no gaps in it except at the front of the unit for ventilation and access. The enclosure should extend a minimum of 100mm beyond the front of the unit and should be fitted with weatherproof insulation to negate the impact of any reflections from the installation of the enclosure.

With the partial enclosure installed there will be no direct line of sight, therefore attenuation due to barrier loss has been considered (calculations are provided in Appendix C).

The noise level at the 1st floor window, with the mechanical plant operating, with recommended noise mitigation installed, is predicted to be **34dB $L_{Aeq,T}$** which is **8dB(A) below** the MCS 020 acceptable noise level (42dB(A)) and therefore complied with the MCS 020 Planning Standard.

4. CONCLUSION

Sound Licensing has undertaken a desktop noise assessment in order to determine the required mitigation level to comply with the MCS 020 Planning Standard. All worst-case scenarios have been applied to the assessment.

In order to meet the acceptable noise level at the nearest sensitive receptor, it has been recommended to install a partial acoustic enclosure around the proposed air source heat pump.

The predicted noise level from the proposed air source heat pump, with the recommended noise mitigation installed, complies with the MCS 020 Planning Standard.

APPENDIX A – Acoustic Terminology

Parameter	Description
Acoustic environment	Sound from all sound sources as modified by the environment
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far
Ambient sound level, $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T
Background sound level, $LA_{90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20×10^{-6} Pascals).
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time
Measurement time interval, T_m	Total time over which measurements are taken
Rating level, $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Reference time interval, T_r	Specified interval over which the specific sound level is determined
Residual sound	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
Residual sound level, $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T
Specific sound level, $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r
Specific sound source	Sound source being assessed

References:

MCS 2019 'MCS Planning Standards for Permitted Development Installation of Wind Turbines and Air Source Heat Pumps on Domestic Premises'

APPENDIX B – Data Sheets and Figures

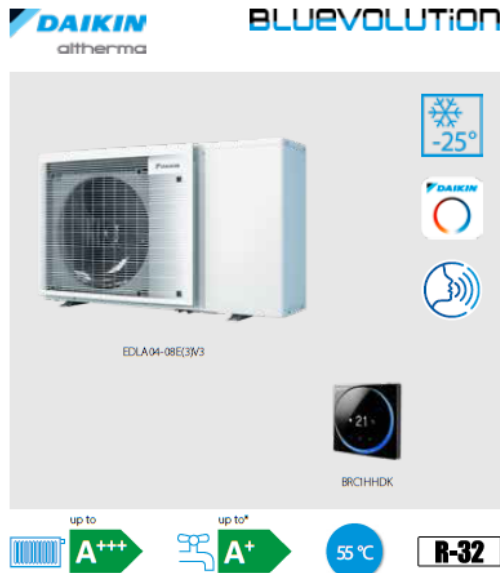
Daikin Altherma Monobloc 4kW (EBLA04EV3) Data Sheet – Air Source Heat Pump

E(B/D)LA04-08(3)V3

Daikin Altherma 3 M

Air-to-water monobloc system that provides **heating**, **domestic hot water** and **optionally cooling**.
Ideal for limited installation space.

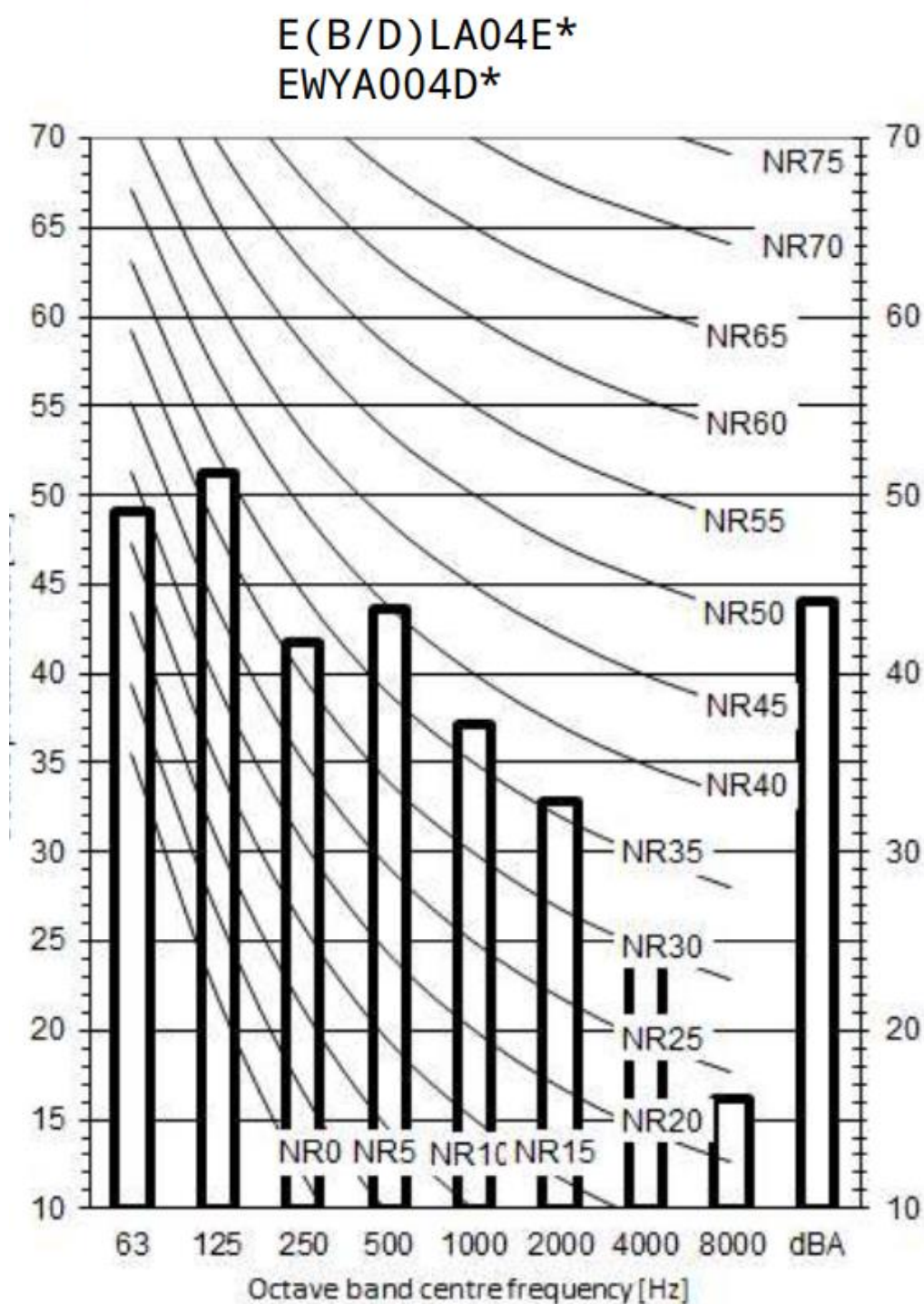
- › WLAN cartridge connection standard included
- › Possible to combine with domestic hot water tanks
- › Heating only or reversible models available
- › Monobloc all-in-one concept including all hydraulic parts
- › Optional plug & play integrated 3 kW electric back-up heater
- › Available in one phase



Single Unit				EDLA04E(3)V3	EBLA04E(3)V3	EDLA06E(3)V3	EBLA06E(3)V3	EDLA08E(3)V3	EBLA08E(3)V3
Heating capacity	Nom.		kW	4.30 (1) / 4.60 (2)	4.30 (1) / 4.60 (2)	6.00 (1) / 5.90 (2)	6.00 (1) / 5.90 (2)	7.50 (1) / 7.90 (2)	7.50 (1) / 7.80 (2)
Power input	Heating	Nom.	kW	0.84 (1) / 1.26 (2)	0.84 (1) / 1.26 (2)	1.24 (1) / 1.69 (2)	1.24 (1) / 1.69 (2)	1.63 (1) / 2.23 (2)	1.63 (1) / 2.23 (2)
COP				5.10 (1) / 3.65 (2)	5.10 (1) / 3.65 (2)	4.85 (1) / 3.50 (2)	4.85 (1) / 3.50 (2)	4.60 (1) / 3.50 (2)	4.60 (1) / 3.50 (2)
Cooling capacity	Nom.		kW	-	4.86 (1) / 4.52 (2)	-	5.83 (1) / 5.09 (2)	-	6.18 (1) / 5.44 (2)
Power input	Heating	Nom.	kW	-	0.82 (1) / 1.36 (2)	-	1.08 (1) / 1.55 (2)	-	1.19 (1) / 1.73 (2)
EBR				-	5.91 (1) / 3.32 (2)	-	5.40 (1) / 3.28 (2)	-	5.19 (1) / 3.14 (2)
Space heating	Average climate water outlet 55 °C	General	η _p (Seasonal space heating efficiency)	127	129	127	128	130	131
			SCOP	3.26	3.29	3.26	3.28	3.32	3.35
	Average climate water outlet 35 °C	General	η _p (Seasonal space heating efficiency)	176	179	176	178	179	181
			SCOP	4.48	4.54	4.47	4.52	4.56	4.61
Casing	Colour			Ivory white					
	Material			Zinc coated low carbon steel					
Dimensions	Unit	Height/Width/Depth	mm	770 x 1,250 x 362					
Weight	Unit		kg	EV3: 88, E3V3: 91					
Compressor	Quantity			1					
	Type			Hermetically sealed swing compressor					
Operation range	Heating	Ambient	Min.-Max.	°CWB	-25 ~ 25	-25 ~ 35	-25 ~ 25	-25 ~ 35	-25 ~ 35
		Water side	Min.-Max.	°C	EV3: 9 ~ 65 / E3V3: 15 ~ 65				
	Cooling	Ambient	Min.-Max.	°CDB	-	10 ~ 43	-	10 ~ 43	-
		Water side	Min.-Max.	°C	-	5 ~ 22	-	5 ~ 22	-
Refrigerant	Domestic hot water	Ambient	Min.-Max.	°CDB	-27 ~ 35				
		Water side	Min.-Max.	°C	25 ~ 55				
	Type				R-32				
	GWP				675				
	Charge		kg		1.85				
	Charge		TCO ₂ eq		0.91				
	Control				Expansion valve				
Sound power level	Heating	Nom.		dBA	58				
Power supply	Name/Phase/Frequency/Voltage		Hz/V		V3/1~/50/230				
Current	Recommended fuses		A		20				

(1) Cooling To 35°C - LWA 18°C (DT=4°C). Heating To DB/WB 7°C/6°C - LWC 35°C (DT=4°C). (2) Cooling To 35°C - LWA 7°C (DT=5°C). Heating To DB/WB 7°C/6°C - LWC 55°C (DT=4°C). This product contains fluorinated greenhouse gases.
*Domestic hot water in combination with stainless steel tank EK-W50/0 and ECHD thermal store EK-WP-096.

Daikin Altherma Monobloc 4kW (EBLA04EV3) Acoustic Data



APPENDIX C – Calculations

As Proposed

Attenuation per double distance required =
(6dB for LpA recommended)

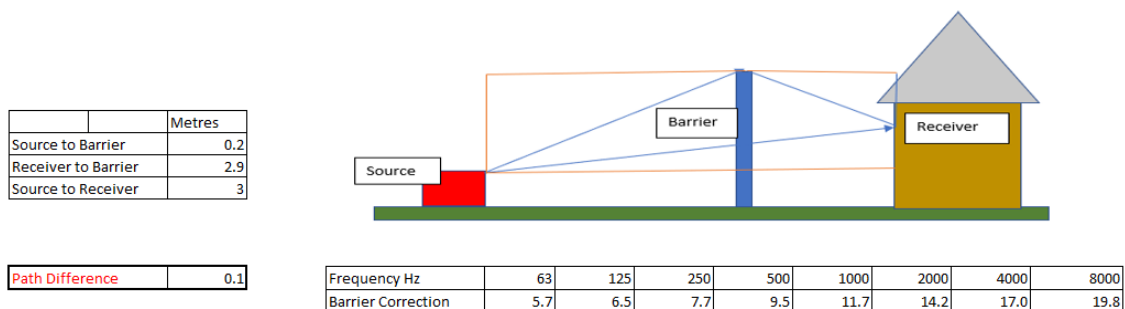
ion per double distance required = 5dB for LpA recommended)	6		dB				Metres			
			Enter Distance =				3			
	Frequency Hz									
	63	125	250	500	1000	2000	4000	8000	Total	
	63	65	55.5	58	51.5	47	39	30	68.02	
Total LW	63.0	65.0	55.5	58.0	51.5	47.0	39.0	30.0	68.02	
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2	-1	1.1		
LWA (Power)	36.8	48.9	46.9	54.8	51.5	48.2	40.0	28.9	58.14	
LPA at New Dist'	19.29	31.39	29.39	37.29	33.99	30.69	22.49	11.40	40.63	
LPA After Insert	19.29	31.39	29.39	37.29	33.99	30.69	22.49	11.40	40.63	

Sound Pressure Level @ Nearest Sensitive Receptor + Façade Reflections (3dB) = 44dB L_{Aeq,T}

With Recommended Mitigation Installed

Applicable where barrier breaks line of sight between source and receiver

Example Illustration of Barrier Attenuation



Barrier Screening Attenuation Calculation – Partial Enclosure

Attenuation per double distance required =
(6dB for LpA recommended)

ion per double distance required = 6dB for LpA recommended)				6	dB			Metres	
				Enter Distance =				3	
	Frequency Hz								
	63	125	250	500	1000	2000	4000	8000	Total
	63	65	55.5	58	51.5	47	39	30	68.02
Total LW	63.0	65.0	55.5	58.0	51.5	47.0	39.0	30.0	68.02
'A' Weight	26.2	16.1	8.6	3.2	0	-1.2	-1	1.1	
LWA (Power)	36.8	48.9	46.9	54.8	51.5	48.2	40.0	28.9	58.14
LPA at New Dist'	19.29	31.39	29.39	37.29	33.99	30.69	22.49	11.40	40.63
SCREENING	5.7	6.5	7.7	9.5	11.7	14.2	17.0	19.8	
LPA After Insert	13.57	24.90	21.67	27.83	22.33	16.49	5.53	-8.44	31.15

Sound Pressure Level @ Nearest Sensitive Receptor + Façade Reflections (3dB) = 34dB L_{Aeq,T}