

PROPOSED ENERGY EFFICIENCY MEASURES & RENEWABLE ENERGY PROPOSALS

Prepared by R&R Design Studio on behalf of Annandale Developments to satisfy condition 17 of approved planning application CM/21/19/PL.

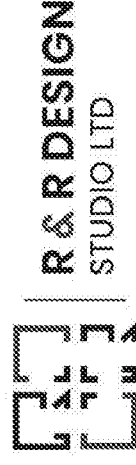
For the proposed redevelopment of:

Scyld,
Horsemere,
Green Lane,
Climping
BN17 5QZ

R&R Design Studio Ltd



6 Kipling House, Newlands Avenue,
Waterlooville, Hants. PO7 5FY



THERMAL ELEMENTS & BUILDING REGULATION REQUIREMENTS

The development has been designed to be highly energy efficient, far in excess of current building regulation requirements, the dwellings will achieve a minimum 30% improvement over the 2013 Dwelling Emission Rate (DER)/ Target Emission Rate (TER) (Equivalent of Code for Sustainable Homes Level 4 for Energy).

See Appendix A for energy assessment summary sheets.

PROPOSED RENEWABLE ENERGY TECHNOLOGY

The main source of heat production within the dwellings will be by way of Air source heat pumps, heat pumps do require electricity to operate, and approximately 75% of the energy required is generated from the outside air, with only 25% being required from electricity. This means that 75% of the energy used will be from a renewable source, which will drastically reduce dwelling emissions and CO2 impact.

See Appendix B for proposed heat source heat pump manufacturer and model.

APPENDIX A

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



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Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot 1 Rev A		Prop Type Ref		
Property					
SAP Rating	86 B	DER	13.01	TER	20.69
Environmental	87 B	% DER<TER	37.12		
CO ₂ Emissions (t/year)	2.04	DFEE	45.79	TFEE	50.63
General Requirements Compliance	Pass	% DFEE<TFEE	9.55		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	20.69	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.01	kgCO ₂ /m ²	Pass
	-7.68 (-37.1%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	50.63	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	45.79	kWh/m ² /yr	
	-4.8 (-9.5%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.16 (max. 0.35)	Pass
Openings	1.25 (max. 2.00)	1.50 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
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Secondary heating system

Room heaters - Wood Logs
Open fire in grate
Efficiency: 37%
Minimum: 37%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

8.12 m², No overhang

Windows facing East

1.88 m², No overhang

Windows facing South

13.06 m², Overhang width less than twice window, ratio 0.68

Windows facing West

2.89 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
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Property Reference	Scyld_Plots	Issued on Date	16/12/2021
Assessment Reference	Scyld_Plot 2_Rev A	Prop Type Ref	
Property			

SAP Rating	84 B	DER	15.59	TER	24.36
Environmental	86 B	% DER<TER	36.00		
CO ₂ Emissions (t/year)	1.78	DFEE	49.41	TFEE	57.48
General Requirements Compliance	Pass	% DFEE<TFEE	14.05		

Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,	Assessor ID	R990-0001
Client			

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity			
Fuel factor	1.55 (electricity)			
Target Carbon Dioxide Emission Rate (TER)	24.36	kgCO ₂ /m ²		
Dwelling Carbon Dioxide Emission Rate (DER)	15.59	kgCO ₂ /m ²		Pass
	-8.77 (-36.0%)	kgCO ₂ /m ²		

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	57.48	kWh/m ² /yr		
Dwelling Fabric Energy Efficiency (DFEE)	49.41	kWh/m ² /yr		
	-8.1 (-14.1%)	kWh/m ² /yr		Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.16 (max. 0.35)	Pass
Openings	1.22 (max. 2.00)	1.50 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
Secondary heating system	None	

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



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5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Medium

Pass

Based on:

Overshading

Average

Windows facing North

2.98 m², No overhang

Windows facing East

16.68 m², No overhang

Windows facing South

0.96 m², No overhang

Windows facing West

5.68 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.12

W/m²K

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
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Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot 3_Rev A		Prop Type Ref		
Property					
SAP Rating	84 B	DER	15.47	TER	24.17
Environmental	86 B	% DER<TER	35.99		
CO ₂ Emissions (t/year)	1.77	DFEE	48.87	TFEE	56.82
General Requirements Compliance	Pass	% DFEE<TFEE	14.00		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	24.17	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.47	kgCO ₂ /m ²	Pass
	-8.70 (-36.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	56.82	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	48.87	kWh/m ² /yr	
	-7.9 (-13.9%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.16 (max. 0.35)	Pass
Openings	1.22 (max. 2.00)	1.50 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
Secondary heating system	None	

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



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5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Medium

Pass

Based on:

Overshading

Average

Windows facing North

2.98 m², No overhang

Windows facing East

16.68 m², No overhang

Windows facing South

0.96 m², No overhang

Windows facing West

5.68 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.12

W/m²K

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
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Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot 4_Rev A		Prop Type Ref		
Property					
SAP Rating	85 B	DER	14.16	TER	22.12
Environmental	86 B	% DER<TER	35.98		
CO ₂ Emissions (t/year)	1.93	DFEE	47.77	TFEE	52.93
General Requirements Compliance	Pass	% DFEE<TFEE	9.74		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	22.12	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.16	kgCO ₂ /m ²	Pass
	-7.96 (-36.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.93	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	47.77	kWh/m ² /yr	
	-5.1 (-9.6%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.22 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.16 (max. 0.35)	Pass
Openings	1.21 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
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Regs Region: England

Elmhurst Energy Systems

SAP2012 Calculator (Design

System) version 4.14r19

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Secondary heating system

Room heaters - Wood Logs
Open fire in grate
Efficiency: 37%
Minimum: 37%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

0.96 m², No overhang

Windows facing East

14.50 m², No overhang

Windows facing South

2.92 m², No overhang

Windows facing West

9.30 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot5_Rev A		Prop Type Ref		
Property					
SAP Rating	85 B	DER	14.07	TER	22.12
Environmental	86 B	% DER<TER	36.39		
CO ₂ Emissions (t/year)	1.91	DFEE	46.95	TFEE	52.93
General Requirements Compliance	Pass	% DFEE<TFEE	11.29		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	22.12	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.07	kgCO ₂ /m ²	Pass
	-8.05 (-36.4%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	52.93	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	46.95	kWh/m ² /yr	
	-5.9 (-11.2%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.16 (max. 0.35)	Pass
Openings	1.21 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Secondary heating system

Room heaters - Wood Logs
Open fire in grate
Efficiency: 37%
Minimum: 37%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

0.96 m², No overhang

Windows facing East

14.50 m², No overhang

Windows facing South

2.92 m², No overhang

Windows facing West

9.30 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot 6_Rev A		Prop Type Ref		
Property					
SAP Rating	84 B	DER	14.44	TER	22.57
Environmental	86 B	% DER<TER	36.03		
CO ₂ Emissions (t/year)	1.97	DFEE	48.87	TFEE	54.42
General Requirements Compliance	Pass	% DFEE<TFEE	10.20		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	22.57	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	14.44	kgCO ₂ /m ²	Pass
	-8.13 (-36.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	54.42	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	48.87	kWh/m ² /yr	
	-5.5 (-10.1%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.16 (max. 0.35)	Pass
Openings	1.21 (max. 2.00)	1.40 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Secondary heating system

Room heaters - Wood Logs
Open fire in grate
Efficiency: 37%
Minimum: 37%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

2.92 m², No overhang

Windows facing East

14.50 m², No overhang

Windows facing South

0.96 m², No overhang

Windows facing West

9.30 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot 7_Rev A		Prop Type Ref		
Property					
SAP Rating	85 B	DER	13.24	TER	21.02
Environmental	87 B	% DER<TER	37.00		
CO ₂ Emissions (t/year)	2.09	DFEE	47.45	TFEE	51.69
General Requirements Compliance	Pass	% DFEE<TFEE	8.20		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	21.02	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.24	kgCO ₂ /m ²	Pass
	-7.78 (-37.0%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.69	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	47.45	kWh/m ² /yr	
	-4.3 (-8.3%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.21 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.21 (max. 0.35)	Pass
Openings	1.26 (max. 2.00)	1.50 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
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Regs Region: England

Elmhurst Energy Systems

SAP2012 Calculator (Design

System) version 4.14r19

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Secondary heating system

Room heaters - Wood Logs
Open fire in grate
Efficiency: 37%
Minimum: 37%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

1.88 m², No overhang

Windows facing East

13.06 m², Overhang width less than twice window, ratio 0.68

Windows facing South

1.01 m², No overhang

Windows facing West

8.12 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot 8_Rev A		Prop Type Ref		
Property					
SAP Rating	86 B	DER	13.09	TER	20.85
Environmental	87 B	% DER<TER	37.23		
CO ₂ Emissions (t/year)	2.07	DFEE	46.81	TFEE	51.14
General Requirements Compliance	Pass	% DFEE<TFEE	8.47		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	20.85	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.09	kgCO ₂ /m ²	Pass
	-7.76 (-37.2%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.14	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	46.81	kWh/m ² /yr	
	-4.3 (-8.4%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.22 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.21 (max. 0.35)	Pass
Openings	1.26 (max. 2.00)	1.50 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
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BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Secondary heating system

Room heaters - Wood Logs
Open fire in grate
Efficiency: 37%
Minimum: 37%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100 %

Minimum

75 %

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

1.88 m², No overhang

Windows facing East

13.06 m², Overhang width less than twice window, ratio 0.68

Windows facing South

1.01 m², No overhang

Windows facing West

8.12 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Secondary heating (wood logs)

N/A

Secondary heating fuel:

wood logs

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Property Reference	Scyld_Plots		Issued on Date	16/12/2021	
Assessment Reference	Scyld_Plot 9_Rev A		Prop Type Ref		
Property					
SAP Rating	85 B	DER	13.28	TER	21.02
Environmental	87 B	% DER<TER	36.81		
CO ₂ Emissions (t/year)	2.09	DFEE	47.69	TFEE	51.69
General Requirements Compliance	Pass	% DFEE<TFEE	7.72		
Assessor Details	Mr. Gavin Rossiner, Gavin Rossnier,			Assessor ID	R990-0001
Client					

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

Criterion 1 – Achieving the TER and TFEE rate

1a TER and DER

Fuel for main heating	Electricity		
Fuel factor	1.55 (electricity)		
Target Carbon Dioxide Emission Rate (TER)	21.02	kgCO ₂ /m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	13.28	kgCO ₂ /m ²	Pass
	-7.74 (-36.8%)	kgCO ₂ /m ²	

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	51.69	kWh/m ² /yr	
Dwelling Fabric Energy Efficiency (DFEE)	47.69	kWh/m ² /yr	
	-4.0 (-7.7%)	kWh/m ² /yr	Pass

Criterion 2 – Limits on design flexibility

Limiting Fabric Standards

2 Fabric U-values

Element	Average	Highest	
External wall	0.22 (max. 0.30)	0.22 (max. 0.70)	Pass
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	Pass
Roof	0.12 (max. 0.20)	0.21 (max. 0.35)	Pass
Openings	1.26 (max. 2.00)	1.50 (max. 3.30)	Pass

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals	5.00 (design value)	
Maximum	10.0	Pass

Limiting System Efficiencies

4 Heating efficiency

Main heating system	Heat pump with radiators or underfloor - Electric Vaillant aroTHERM plus 12kW + Hydraulic module VW1125/6A230VS2+VWZMEH97/5MB2	
---------------------	--	--

Regs Region: England

Elmhurst Energy Systems

SAP2012 Calculator (Design

System) version 4.14r19

BASIC COMPLIANCE REPORT

Calculation Type: New Build (As Designed)



R & R DESIGN
STUDIO LTD

Secondary heating system

Room heaters - Wood Logs
Open fire in grate
Efficiency: 37%
Minimum: 37%

Pass

5 Cylinder insulation

Hot water storage

Nominal cylinder loss: 2.27 kWh/day
Permitted by DBSCG 2.86

Pass

Primary pipework insulated

Yes

Pass

6 Controls

Space heating controls

Programmer and at least two room thermostats

Pass

Hot water controls

Cylinderstat

Pass

Independent timer for DHW

Pass

7 Low energy lights

Percentage of fixed lights with low-energy fittings

100

%

Minimum

75

%

Pass

8 Mechanical ventilation

Continuous extract system (decentralised)

Specific fan power

0.1600 0.1700

Maximum

0.7

Pass

Criterion 3 – Limiting the effects of heat gains in summer

9 Summertime temperature

Overheating risk (South East England)

Slight

Pass

Based on:

Overshading

Average

Windows facing North

1.88 m², No overhang

Windows facing East

13.06 m², Overhang width less than twice window, ratio 0.68

Windows facing South

1.01 m², No overhang

Windows facing West

8.12 m², No overhang

Air change rate

4.00 ach

Blinds/curtains

None

Criterion 4 – Building performance consistent with DER and DFEE rate

Air permeability and pressure testing

3 Air permeability

Air permeability at 50 pascals

5.00 (design value)

Maximum

10.0

Pass

10 Key features

Roof U-value

0.11

W/m²K

Floor U-value

0.12

W/m²K

Secondary heating (wood logs)

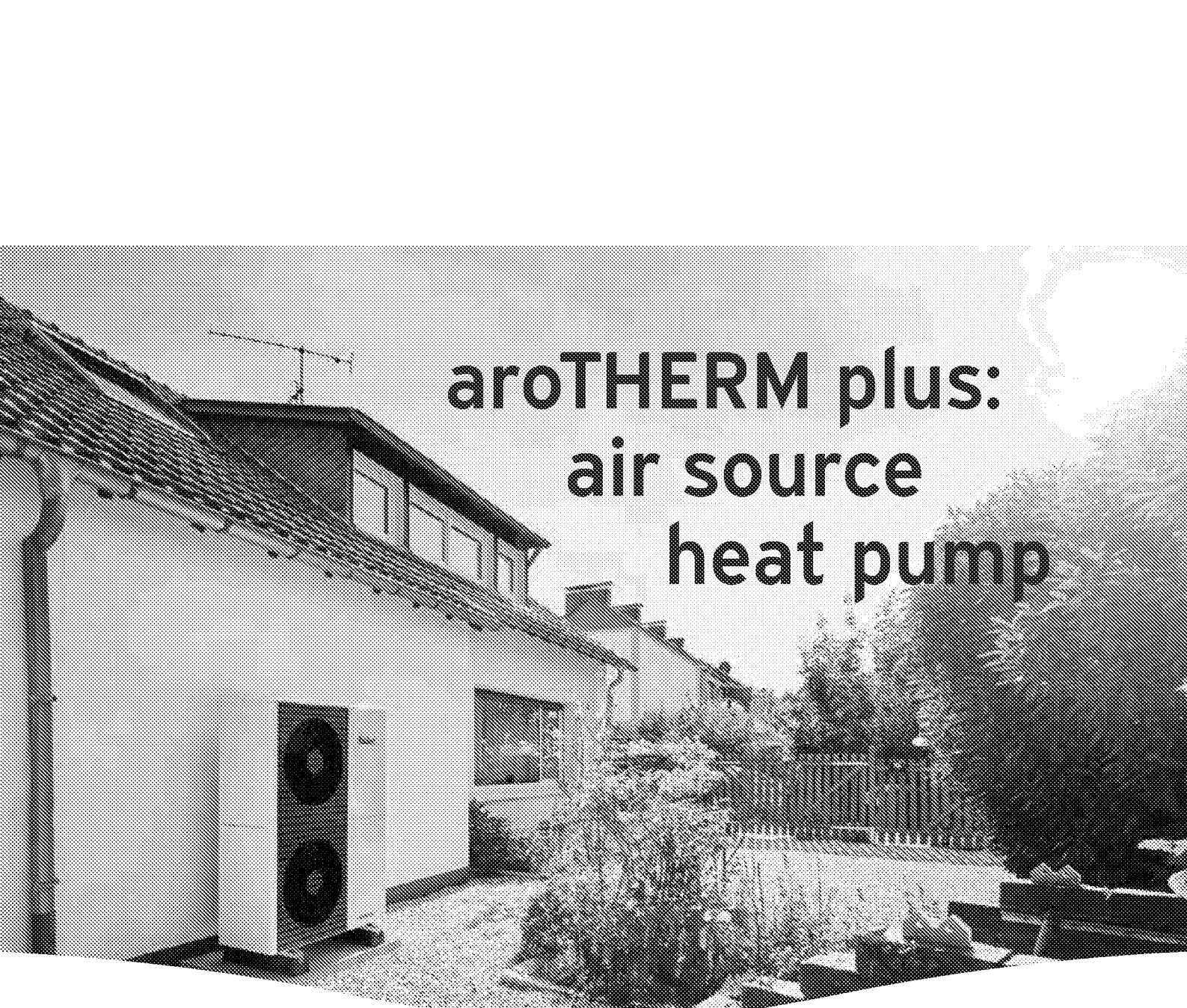
N/A

Secondary heating fuel:

wood logs

This report has not been submitted through the Elmhurst Energy members' portal, therefore results are subject to change when the dwelling is completed.

APPENDIX B



aroTHERM plus: air source heat pump

 **Vaillant** Comfort for your home

Air source heat pump

Best suited for:

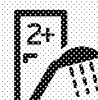


New build, renovations
and replacement

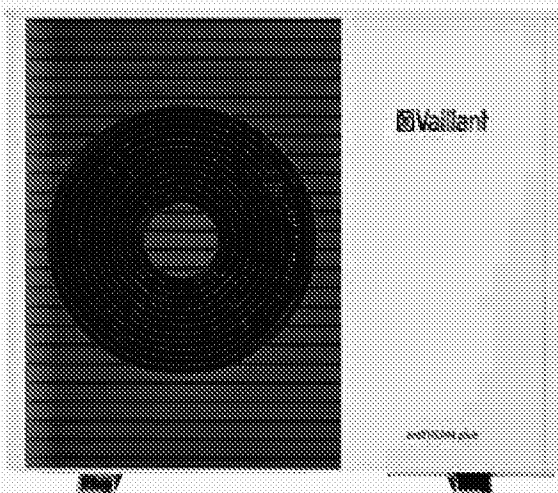


+++

One or more
people



Two plus bathrooms



What are the advantages?

- **Higher hot water demand capability**
High flow temperatures
- **Sustainable**
Reduce your carbon footprint with a GWP of just three
- **Eligible for government incentives**
Such as RHI
- **Energy efficient**
With the highest ErP rating save money on your fuel bill*
- **Designed for a peaceful home**
With noise levels as low as 54 dB(A)
- **App controlled**
When installed with VR 900 or sensoNET control

*When compared to replacing an oil system

What is an air source heat pump?

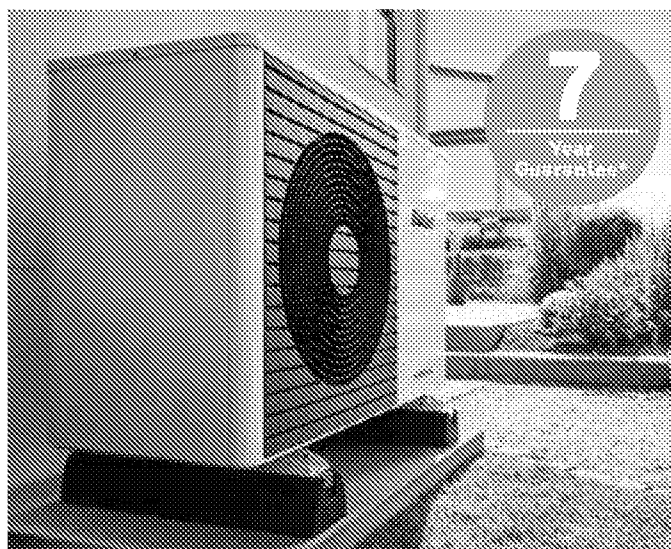
Air source heat pumps extract thermal energy (heat) from the outside air and convert this into heating and hot water for your home. They are designed to work in cold temperatures and are suitable for a range of homes, from a small apartment* to a large detached property. The heat pump needs to be located outside the property. It's very quiet in operation, being no louder than a domestic fridge.

Air source heat pumps do require electricity to operate, and approximately 75% of the energy required is generated from the outside air, with only 25% being required from electricity. This means that 75% of the energy you use will be from a renewable source, which will reduce your emissions and CO₂ impact.

*Air source heat pumps need to be located outside. They must be installed on a solid base or structurally secure wall. A qualified and reputable renewables installer will be able to advise you if your home is suitable for an air source heat pump.

aroTHERM plus

air source heat pump outdoor unit



*Up to seven years when installed by a registered Vaillant Advance Partner

The aroTHERM plus provides heating and hot water from renewable energy. It's perfect for both new build and retrofit properties that demand low running costs, high efficiency, and an environmentally friendly solution.

The aroTHERM plus is an outdoor unit which comes in a variety of outputs to suit every property.

Heat source	Air
Outputs (kW)	3.5, 5, 7*, 10** and 12kW**
Usage	New building, renovation, replacement
Heat emitters	Underfloor heating and/or radiators
House size	Up to 300m ²
Decibel level (sound power)	54, 55*, 60dB**
ErP rating	A+++ / A++ (A+++ - D)
SCoP rating	Up to 4.88

The benefits of the aroTHERM plus

- With the aroTHERM plus heat pump you can reduce your carbon footprint and contribute to climate protection by already meeting future building regulations.
- The aroTHERM plus system is suitable for a broad range of properties with underfloor heating and/or a radiator system. Depending on the heat demand and living space of your home, it will be suitable for retrofit projects.
- Designed for a peaceful home, the aroTHERM plus system has very low sound emissions, reassuring for you and your neighbours.
- With sound power as low as 54dB(A) the aroTHERM plus 3.5, 5, 7 and 12 kW outputs have been accredited with the Quiet Mark.
- ErP A+++ rated with a SCoP up to 4.88, your monthly running costs for heating and hot water can be reduced by more than 30% compared to a replaced oil heating system.
- Compatible with app-based controls to allow you to control your heating on the go.



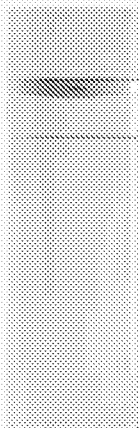
Indoor unit options

Air source heat pumps have an outdoor and an indoor unit for every installation. The aroTHERM plus has been developed to work in harmony with a variety of indoor units to suit your installation.

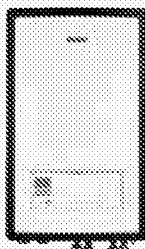
The uniTOWER indoor unit is a compact solution with all system components inside one tall unit, ideal for properties with limited space.

The hydraulic module has all hydraulic components inside one unit allowing the heat pump to provide heating. If hot water is required, the hydraulic module can easily connect to a new or existing heat pump hot water cylinder.

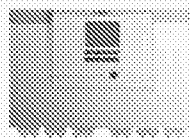
The heat pump interface is ideal for customised applications where the heat pump interface acts as the central point of the system connecting to a back-up heater, expansion vessel, heat exchanger module, and heat pump hot water cylinder if hot water is required.



uniTOWER

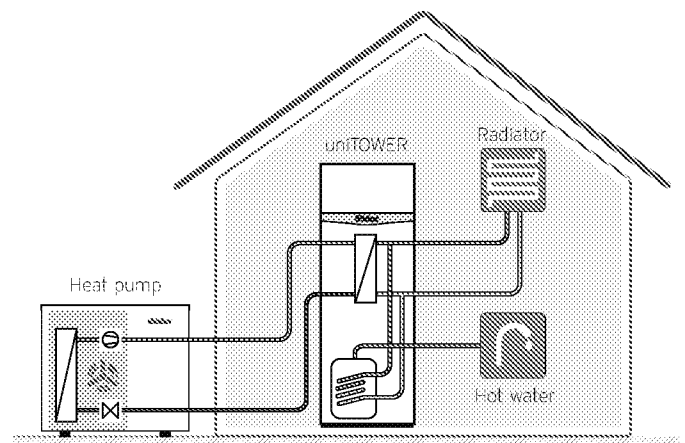


Hydraulic module



Heat pump interface

aroTHERM plus with uniTOWER



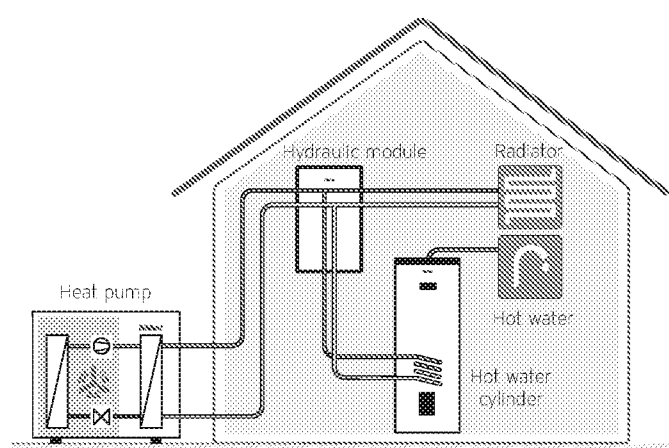
Benefits of aroTHERM plus with uniTOWER

- Heating system components integrated within the uniTOWER
- Thanks to the compact design, the uniTOWER is about the size of a fridge freezer
- 190 litre cylinder capacity delivers up to 380 litres of hot water for up to five people including the use of rainfall showers
- Quick and easy installation within just one day

Products required for this solution:

- 1) aroTHERM plus
- 2) uniTOWER
- 3) Controls

aroTHERM plus with hydraulic module



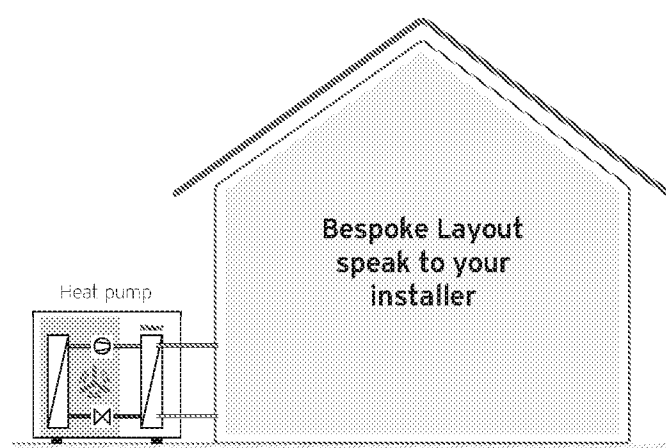
Benefits of aroTHERM plus with hydraulic module

- Heating system components integrated within the hydraulic module
- Easy to connect to unitFOR heat pump hot water cylinder if hot water is required. unitFOR heat pump hot water cylinders are available between 150 and 500 litres dependant on your needs.
- Can be connected to larger hot water cylinders.

Products required for this solution:

- 1) aroTHERM plus
- 2) Hydraulic module
- 3) Hot water cylinder
- 4) Controls

aroTHERM plus with heat pump interface



Benefits of aroTHERM plus with heat pump interface

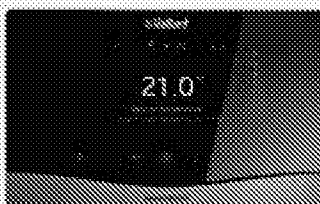
- Heating system components installed separately
- Can be connected to larger hot water cylinders and Vaillant components
- Can be connected to existing boiler system for a hybrid heating and hot water solution.

Products required for this solution:

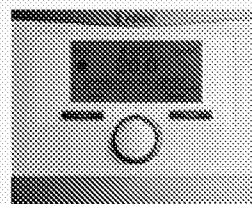
- 1) aroTHERM plus
- 2) Heat pump interface
- 3) Choice of heating components as designed by your installer.

Smart control options

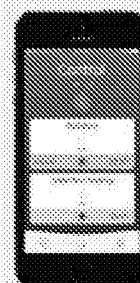
To control your heating and hot water system, you will need a system control where you can program your heating and hot water. You have a choice of Vaillant controls with either the sensoCOMFORT or VRC 700 which both come in wired or wireless options. Your local installer can advise on the right option to suit your requirements. Plus, you can also control your device with our smartphone app.



sensoCOMFORT



VRC 700

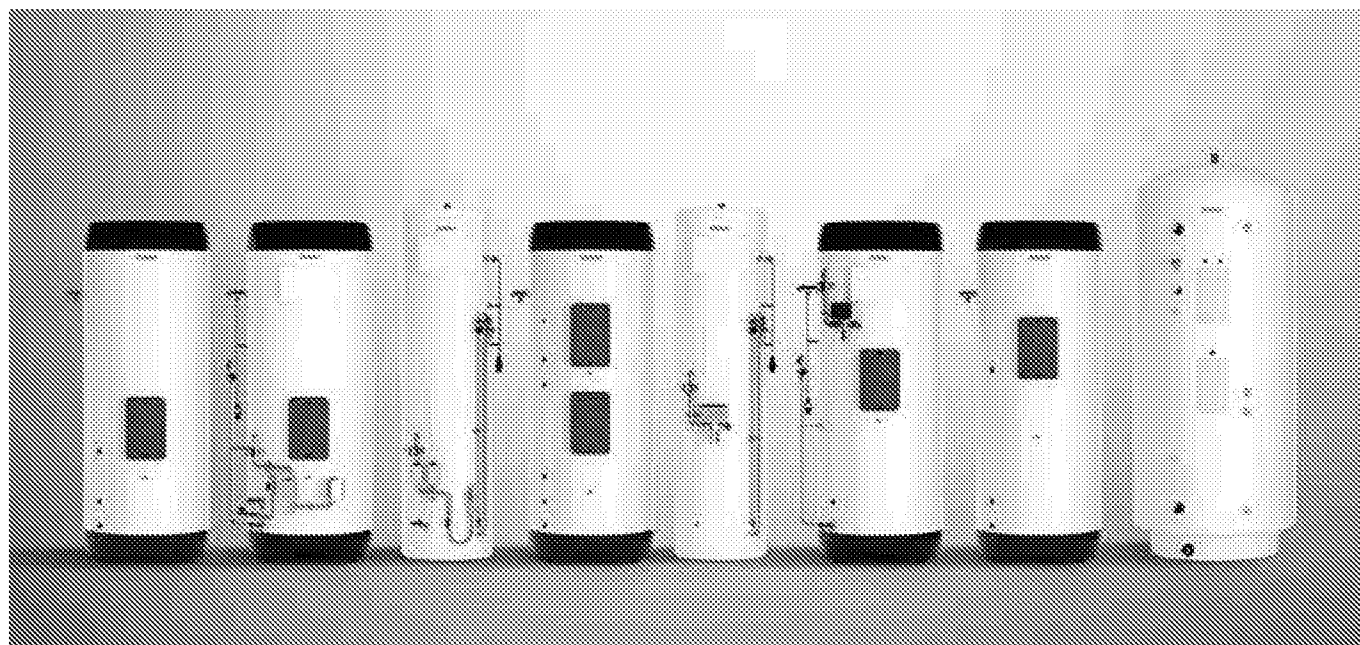


Smartphone app

Cylinder options

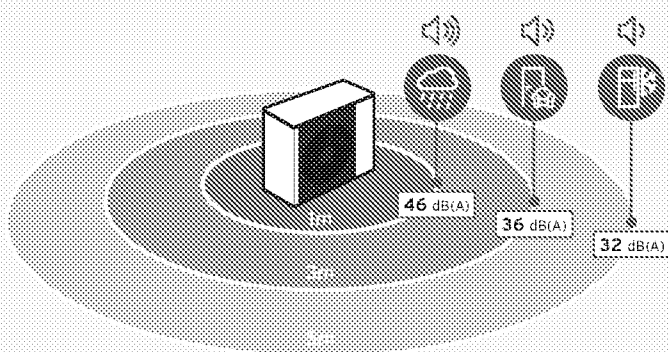
If you require hot water in your property, you have the option to use the indoor UNITOWER unit or a hot water cylinder. Vaillant UNISTOR hot water cylinders are available in a range of sizes for heat pumps and hybrid systems.

Speak to your installer to choose the correct cylinder for your needs.



Key terms explained

What is sound power?



Sound emission from the aroTHERM plus

5kW heat pump, free standing

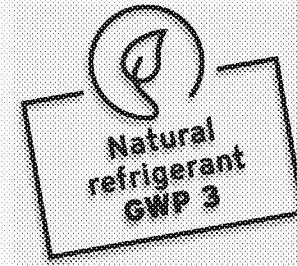
Sound power

This is the rate at which sound energy is emitted from a unit. The sound power of all heating products like heat pumps and boilers are displayed on the ErP product label.

Sound pressure

This is the volume of sound you hear as the sound travels through the air. So the further away you move from the sound source, the lower the volume of sound you hear. Sound pressure values are always lower than sound power values. An example of the sound pressure value would be 46dB(A) the (A) shows that is a sound pressure value.

What is Global Warming Potential (GWP)?



GWP is a comparative value that indicates the greenhouse effect of a greenhouse gas, such as a refrigerant, if it were to be released into the environment. The higher the value, the worse the impact on the climate. The aroTHERM plus has a very low impact on the environment, with an outstanding GWP of just three.

Coefficients Of Performance (CoP)

CoP is the efficiency ratio of heating output compared to the energy input required to power the unit depending on the air and flow temperatures. The higher the CoP figure, the more efficient the heat pump is. Air source heat pump units usually have a CoP of around 3 - 4, the aroTHERM plus has a CoP up to 5.2, making it highly efficient.

Seasonal Coefficient Of Performance (SCoP)

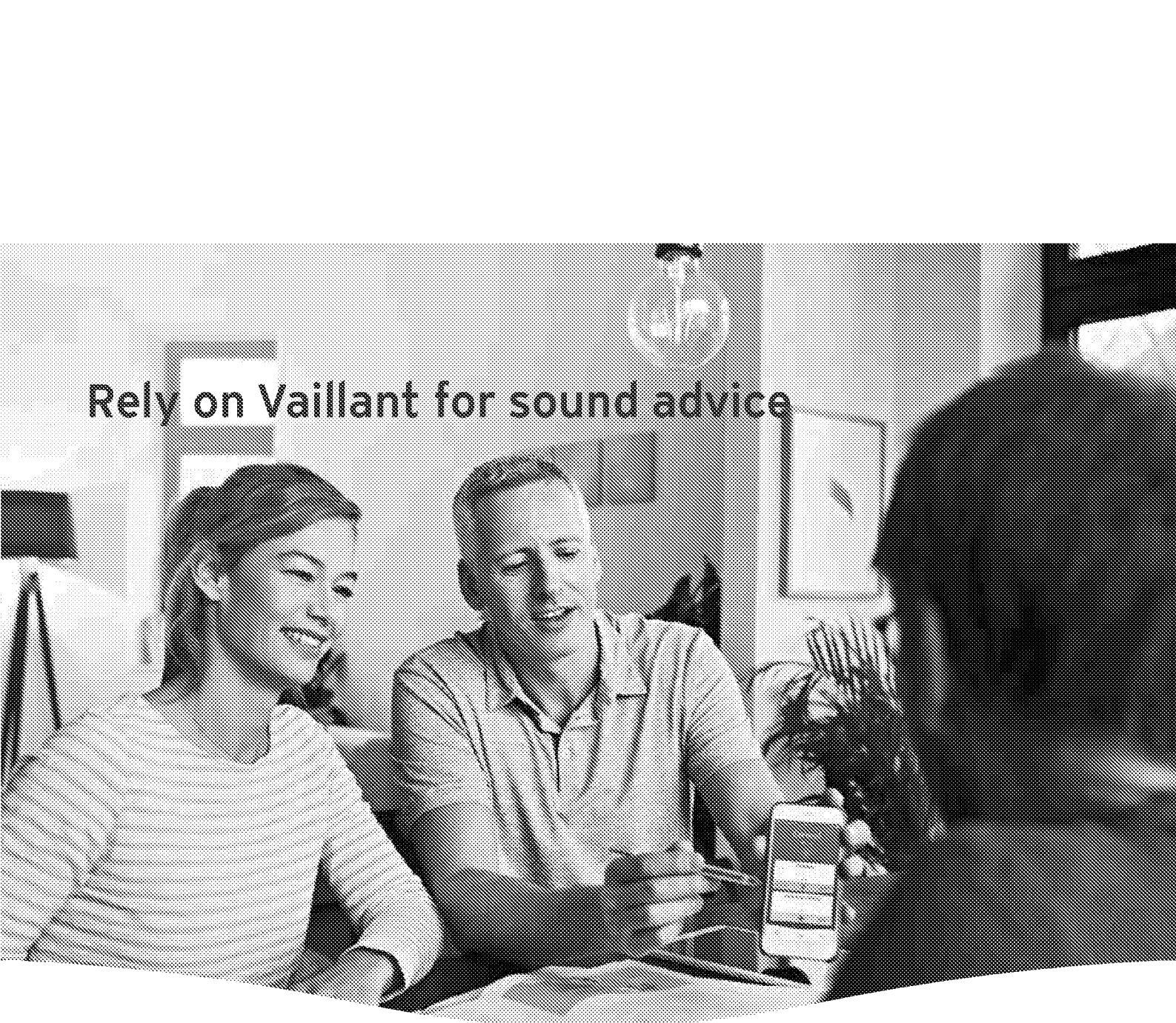
SCoP is a value that describes the efficiency of the output of the heat pump. It's derived from analysing the data from a combination of tests taken over the course of a year (to allow for seasonal variation). A SCoP value is used to calculate the running cost of your heat pump; the higher the SCoP value, the more efficient the heat pump and the lower the running costs of your heating system. This figure is required for the UK Government Renewable Heat Incentive (RHI) subsidy.

What is RHI?

RHI is the subsidy programme from the UK Government that pays quarterly dividends for seven years if you install, or have already installed, renewable technology to heat your home.

All Vaillant heat pumps are MCS accredited and eligible for RHI.





Rely on Vaillant for sound advice



Heating



Hot water



Renewables

Vaillant Group UK Ltd.

Nottingham Road, Belper, Derbyshire DE56 1JT

With its first-rate service, Vaillant can make life more comfortable before your new heating system has even been installed.

The first person to contact is, of course, your renewable heating engineer who will provide expert advice on all of the technical aspects. To find a Vaillant renewable heating engineer near you, please visit: **vaillant.co.uk/findaninstaller**

If you would like details of the latest products and comprehensive information about heating in general, you can visit us online at any time: **vaillant.co.uk**



VALLFTB2CPLUS0520