DT 9771 PG Cert in Building Performance EED (Energy Efficiency Design)

ENEN 9103 DEAP CALCULATION

NZEB
HOUSE

30 kWh/m²/yr

Final Submission: 01-02-19

Contents

1. Scope of Report & Executive Summary

1.1 Scope of Report

The aim of this study is to develop an appropriate energy performance specification for a given house, to be compliant with Irish Building Regulations and meeting the EU NZEB target of 30 kWh/m²/yr, based on an accurately modelled DEAP assessment of same.

An initial preliminary analysis has been undertaken to explore possible solutions. A base specification was taken as the starting point and incremental steps applied to the base to explore the impacts. A summary of the measures and the results are outlined in Section 2 of this study. Some generic values were used in the preliminary analysis to establish if any of the particular options met the criteria or arrived close to the criteria of 30 kWh/m²/yr. The impact and findings of alternative solutions were recorded and used to establish an optimal solution. The theoretical optimal solution was then tested with actual product information and details sourced from suppliers and manufacturers. Further refinement was then carried out to ensure the target was met.

1.2 Executive Summary

A number of steps were taken to ascertain how to achieve the required compliant specification.

Two distinct options emerged from the analysis:

- one using a gas boiler, solar hot water, MVHR and Solar Photovoltaics
- one using a heat pump, MVHR and Solar Photovoltaics.

The heat pump option was determined to be the optimal solution and some tweaks were carried out to further refine this and produce an outline design and specification. The outline specification achieves the required brief and exceeds it to achieve an A1 rating.

The optimal solution adopted a fabric first approach but has sought to keep this optimal – although lower levels can be achieved, an optimal level has been arrived at in the study. With very low U value levels of insulation, coupled with low levels of air tightness through using MVHR, the study has arrived at a solution whereby the space heating requirement is well below the standards of a current Part L 2011 compliant house. The baseline specification in this study has a space heat requirement of 3186 kWh/y. With the optimal solution proposed, the space heat requirement is reduced by almost 50% to 1587 kWh/y. The heat loss in January in the optimal solution is 1835W – this is the max for any of the 12months – giving good flexibility in the choice of heating systems as the number of heat emitters required will be substantially lower than current Part L 2011 compliant house.

2. Preliminary Analysis

A baseline set of data was established to commence the preliminary analysis. The base line was taken from the Aecom Study for the Department of Housing,, Planning and Local Government dated 05 April 2018 titled Calculations for Part L 2018 TGD: Dwellings – the specification is summarised at appendix A1.

The following summary is for the out puts from the specification above in DEAP and will give the summary by which the preliminary analysis will be compared for each of steps taken:

Model	**Total Heat Loss (W/k)**	**Annual Hot water demand**	**Annual Space Heat Demand**	**RER**	**Deliver Energy(kWh/yr/m2)**	**Primary Energy (kWh/yr/m2)**	**BER**
Base (spec given above)	191	3131	3122	22.5	45.21	48.98	A2

Following from the study in ENEN 9101, the core principles establish in that study were applied through a list of steps to assess the impact on the energy use through 2 options:

Option 1. MVHR, Gas Heating with Renewable Solar & PV

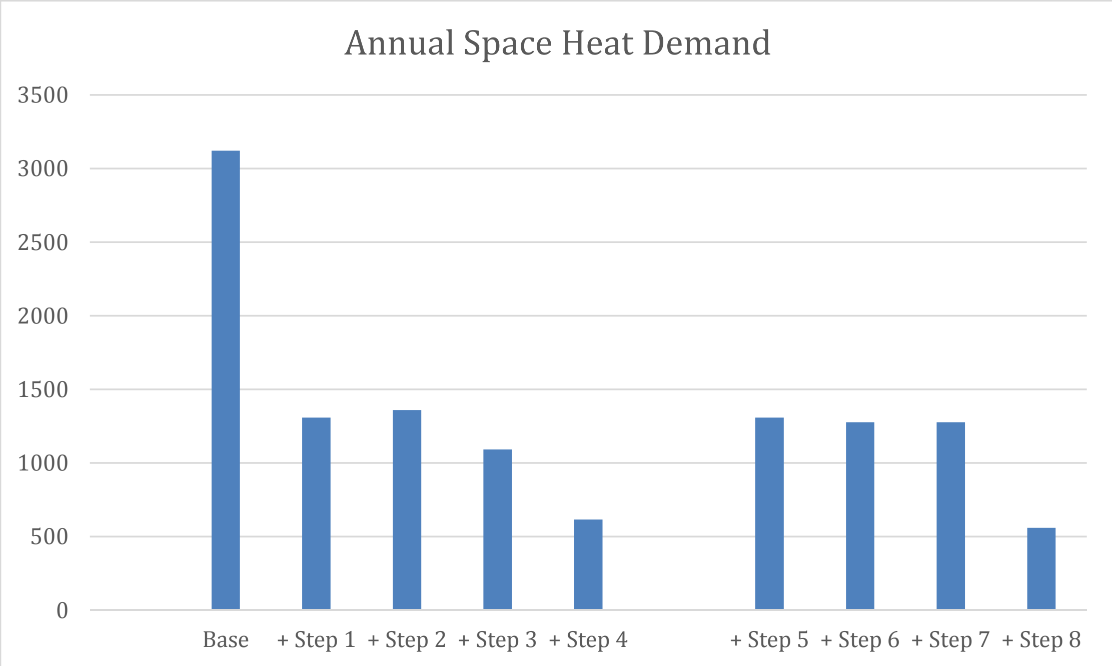
Step no.	**Description**	**Rational**
Base + Step 1	Replace natural ventilation with Mechanical Ventilation Heat Recovery. Use Vent Axia Kinetic Plus E with rigid ducting.. Specific Fan power 0.74. Efficiency 80%	Ventilation heat loss in base model is 88 W/K. Controlling the ventilation will bring this value down. Additional power to run system will need to offset against improved heat loss. Initial revised figure is 53 W/K. Air tightness improved to 3ACH brings the figure down to 40W/K
+ Step 2	Add solar hot water to existing water heating. Replace tank with 250L tank – combined cylinder with 100L of solar storage. Cylinder Thermostat. Solar powered solar water heating pump. 8m2 of flat plate glazed panels. Insulating the primary pipe was included.	The hot water heating requirement is 3131. For a house this size, this is standard. Providing renewable source for part of the heating will impact the overall HW requirement. It is noted that the entire south side of the roof will be almost covered in panels as PV is also in place.
Base + Step 3	Increase the U value of the windows to 0.7	This reduces the heating demand as heat loss through the building fabric reduces. This small adjustment brings the PE to below 30kWh/yr/m2
Base + Step 4	Increase U value of walls to 0.1, roofs to 0.09 and floor to 0.11. Improve Y factor value to 0.03.	This reduces the heating demand as heat loss through the building fabric reduces. This These adjustment brings the PE to below 25kWh/yr/m2 into A1 category

Option 2. MVHR, Air to Water Heat Pump with Renewable PV

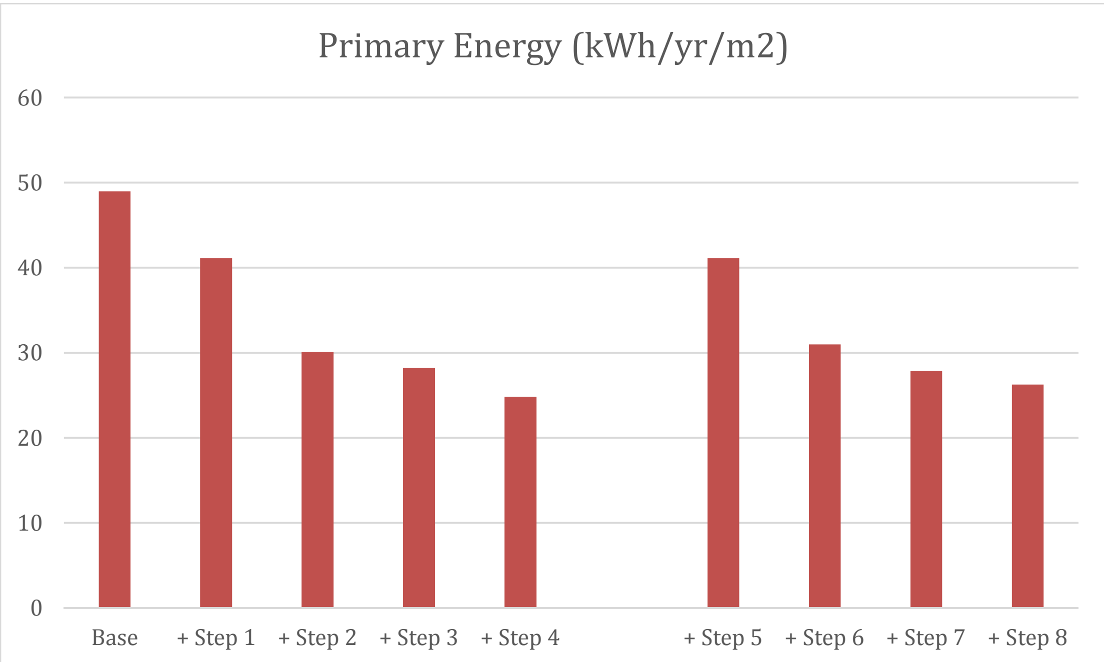
Step no.	Description	Rational
Base + Step 5 (same as step 1)	Replace natural ventilation with Mechanical Ventilation Heat Recovery. Use Vent Axia Kinetic Plus E with rigid ducting.. Specific Fan power 0.74. Efficiency 80%	Ventilation heat loss in base model is 88 W/K. Controlling the ventilation will bring this value down. Additional power to run system will need to offset against improved heat loss. Initial revised figure is 53 W/K. Air tightness improved to 3ACH brings the figure down to 40W/K
+ Step 6	Replace gas boiler with air to water heat pump. Dimplex A8MX with radiators. 542% efficient for space heating.. 202% efficient for water heating.	This will increase electrical requirements. This will need to be offset against efficiencies in system. There will be a renewable contribution to offset against additional required load.
+ Step 7	Increase PV to 1.45 Wp	Increase renewable supply to supply heat pump.
+ Step 8	Increase U value of walls to 0.1, roofs to 0.09 and floor to 0.11 and windows to 0.7. Improve Y factor value to 0.03.	This reduces the heating demand as heat loss through the building fabric reduces. This These adjustment brings the PE to below 25kWh/yr/m2 into A1 category

The following table and graphs summarizes the results from the steps taken above:

Model	Total Heat Loss (W/k)	PE for Main Water Heating	Annual Space Heat Demand	RER	Deliver Energy(kWh/yr/m2)	Primary Energy (kWh/yr/m2)	BER
Base	191	4853	3122	22.5	45.21	48.98	A2
+ Step 1	143	4853	1308	26.1	35.94	41.13	A2
+ Step 2	143	2911	1360	42.6	25.91	30.10	A2
+ Step 3	135	2911	1092	44.2	24.19	28.20	A2
+ Step 4	117	2911	615	47.4	21.12	24.83	A1
+ Step 5	143	4853	1308	26.1	35.94	41.13	A2
+ Step 6	143	4306	1277	42.2	14.90	30.99	A2
+ Step 7	143	4306	1277	48.6	13.40	27.87	A2
+ Step 8	117	4306	559	47.9	12.62	26.26	A2



Impact of steps on Annual Space Heat Demand



Impact of steps on Primary Energy

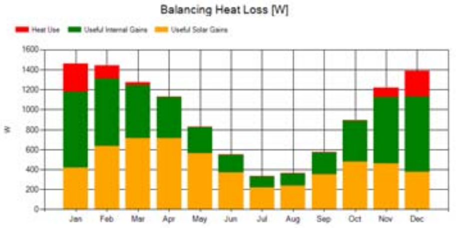
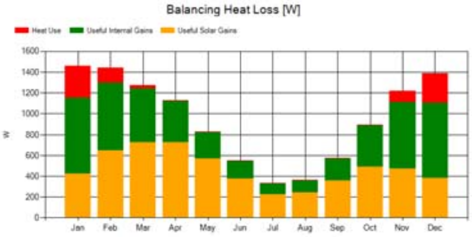
The results were in line with the strategy in the study in ENEN 9101 whereby a fabric first approach combined with MVHR has substantially reduced the annual space heating requirement. Both options are achieving the target value. As can be seen from the above steps, there is little between the 2 options from a Primary Energy requirement.

The next section will review which option is optimal.

3. Optimal Solution

The previous section arrived at 2 options for achieving the NZEB standard.

The following table will compare and contrast the 2 options with a view to arriving at an optimal solution:

Comparison Item	Option 1 – MVHR, SHW, PV	Option 2 – MVHR, Heat Pump, PV
Heat Loss		 Requirements for balancing heat loss are slightly advantageous as the requirement is slightly lower
Renewable Energy Ratio	Space on the roof is limited for additional PV as both PV and Solar panels are present.	Slightly higher ratio. Could be improved with more PV added to roof.
Energy Source	Gas boiler relies on a fossil fuel.	• All electric solution dependent on electricity. Moving towards carbon neutral production. • More PV can be used as Heat pump required run continuously for long periods in a day.
Fuel cost	Currently gas is approx. one third cheaper than electricity.	Electricity more expensive than gas.
Delivered Energy	Substantially higher relative to Option 2.	Substantially lower at approx. 12.5 kWh/yr/m2. With improvements in PE factors in the future, the primary energy required will decrease.
Industry knowledge	Older technology around gas boilers. Easier to maintain	Heat pump technology is relative new. Good level of knowledge in construction industry.
Cost	From Aecom Study, high level costs for gas boiler system, solar hot water, PV and MVHR is approx. €20,500.	From Aecom Study, high level costs for heat pump system, MVHR and PV(**Optimal solution will have 2.3kWp**) is approx. €22,500. Less maintenance costs envisaged in this option as there are less systems. Over the lifespan of the systems (20 years with regular maintenance) the reduced maintenance costs make this option cost optimal

Fabric	Lower U values to fabric elements requires more material and modelling of junctions. Moving away from standard construction and standard construction skills.	Lower U values to fabric elements requires more material and modelling of junctions. Moving away from standard construction and standard construction skills. **Optimal solution will propose higher U values and Y factor.**
Number of Technologies	4 main technologies used – MVHR, PV, SHW, Gas boiler.	3 main technologies used – MVHR, PV, Heat pump.
Maintenance	More technologies to maintain	Less technologies to maintain. All electrically based so one engineer could maintain all systems.
Future Flexibility	Roof limited to PV panels in this option.	Future developments in electrification of the home including electric car charging could be make use of further PV installed on the roof.

3.2. Optimal Solution

The solution proposed has taken the MVHR, Heat Pump and Photovoltaic solution set out after step 8 and has added additional PV to cater for the additional electrical loads of running the Heat Pump and MVHR. The proposed specification has opted for very low fabric levels but not extremely low levels to optimise construction skill sets and industry knowledge towards mainstream solutions.

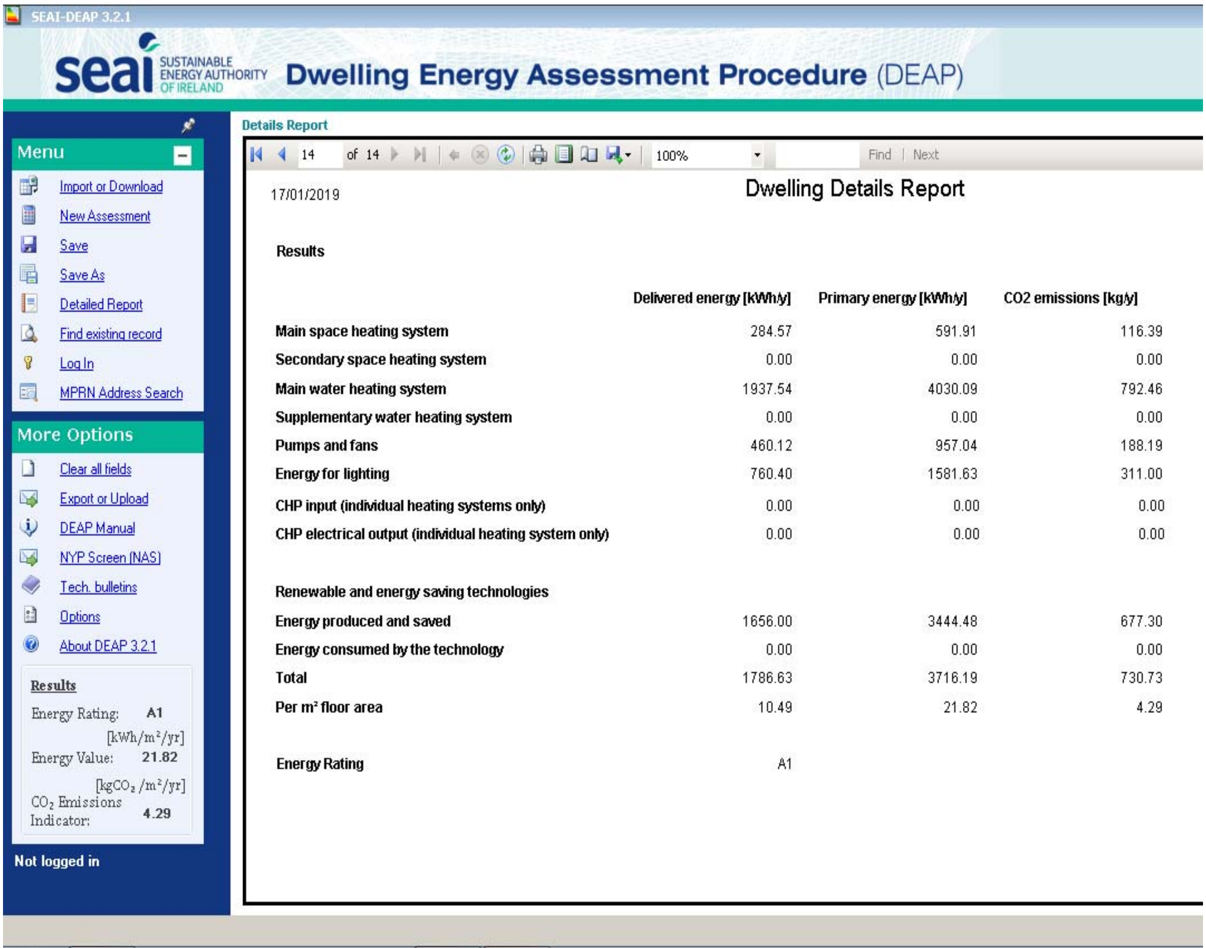
The optimal solution has been chosen as follows:

Element	Specification	Reason
External Wall U Value(W/m2K)	0.15	Optimise amount of insulation. Use of ACDs. Standard construction method on site.
Floor U-value (W/m².K)	0.14	Optimise amount of insulation. Use of ACDs. Standard construction method on site.
Roof U-value (W/m².K)	0.11	Optimise amount of insulation. Use of ACDs. Standard construction method on site.
Windows and glazed doors U-value	0.7 W/m².K Triple glazing. low E (En = 0.05, soft coat), argon filled, aluinium	Readily available. Gives better payback over double glazing – refer to author's ENEN 9102b project.
Thermal Bridging Y-value	0.08	Use of ACDs keeps construction simpler.

Thermal mass	Medium	
Air Permeability (m^3/hm^2 @ 50Pa)	3	Coupled with MVHR for greater reduction in heat loss.
Ventilation strategy	MVHR	Substantial reduction in heat loss – over 50% reduction in heat loss dueto ventilation – 88W/K to 40W/K
Space heating and hot water system	Air to water Heat Pump	Highly efficient heating system(542%) and water heating(202%)
Heating system efficiency	542%	
Secondary space heating system	None	
Controls	Time and temperature zone control	
Central heating pump	High efficiency pump (energy consumption of 52kWh/yr)	
Hot water demand	Based on floor area; 1 shower with 6 litres/min flow restrictor 1 Bath; No electric showers; Overall target of 125 litres/person/day	
Hot water cylinder size	250 litres; 100mm factory insulated	
Lighting	100% low energy lighting, conforming to the following specification: · A+ Rated Bulbs; · 94 lumen/cW; · 4 W/m2	
PV panels	Orientation - South; Tilt -40; over-shading – none; 2.3 KWp	Increased to counteract electrically demand from MVHR and Heat pump systems.

4. DEAP Assessment

The following is a summary of the optima l DEAP assessment:



17/01/2019

Dwelling Details Report

Results

	Delivered energy [kWh/y]	Primary energy [kWh/y]	CO2 emissions [kg/y]
Main space heating system	284.57	591.91	116.39
Secondary space heating system	0.00	0.00	0.00
Main water heating system	1937.54	4030.09	792.46
Supplementary water heating system	0.00	0.00	0.00
Pumps and fans	460.12	957.04	188.19
Energy for lighting	760.40	1581.63	311.00
CHP input (individual heating systems only)	0.00	0.00	0.00
CHP electrical output (individual heating system only)	0.00	0.00	0.00
Renewable and energy saving technologies			
Energy produced and saved	1656.00	3444.48	677.30
Energy consumed by the technology	0.00	0.00	0.00
Total	1786.63	3716.19	730.73
Per m² floor area	10.49	21.82	4.29
Energy Rating	A1		

5 Specification and Schematics

The following is the specification for the key elements of the house to achieve the optimal solution:

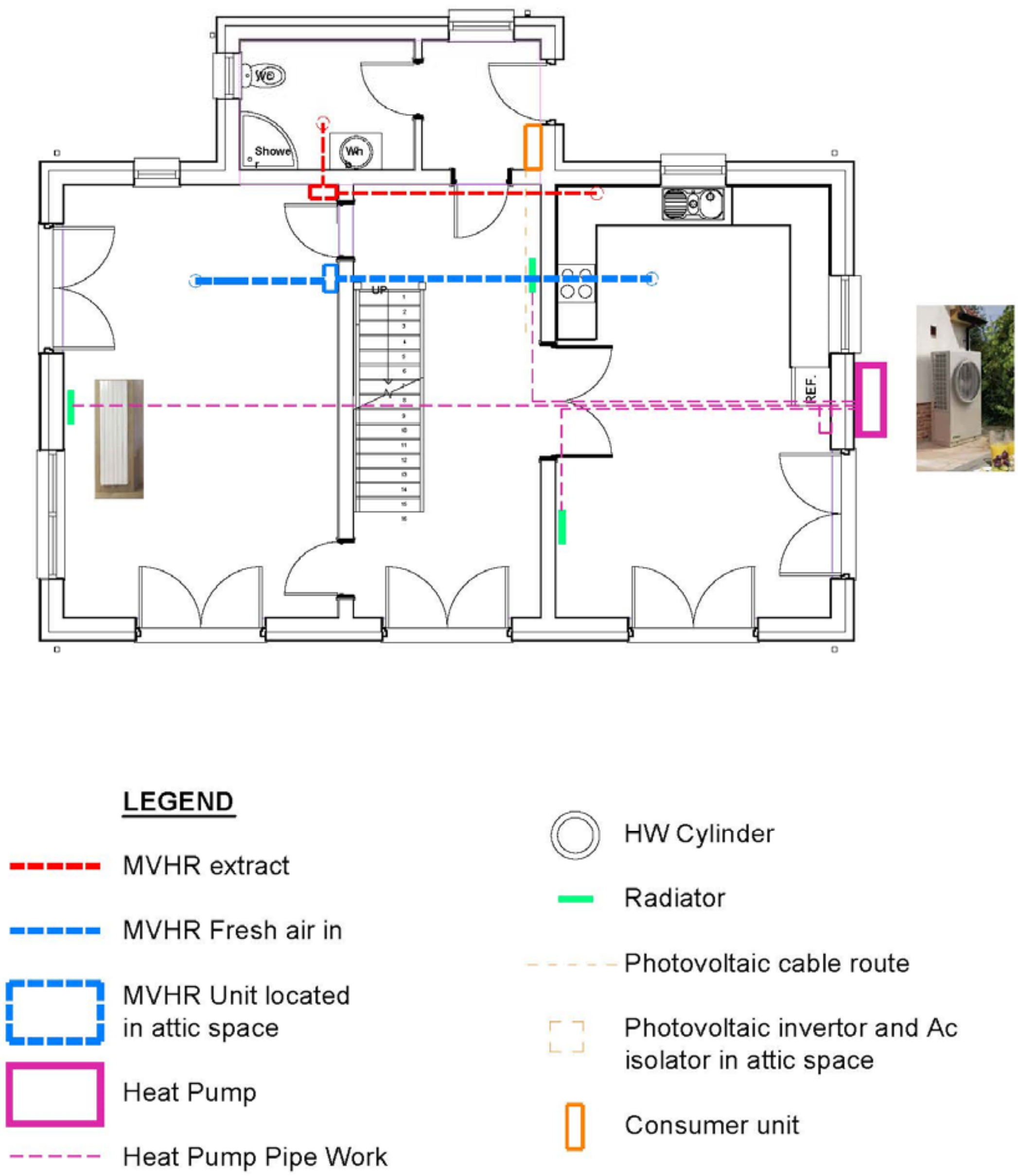
<table>
<tr><th>ITEM</th><th>Description</th><th></th></tr>
<tr><td>Walls</td><td>200mm KORE silver EPS EWI on 215mm Blockwork. StoTherm external render system.</td><td>
<table>
<tr><th colspan="3">New Buildings</th></tr>
<tr><td></td><td colspan="2">Plasterboard, Solid Blockwork, Insulation, Render</td></tr>
<tr><td>Insulation</td><td>KORE External EPS70 White</td><td>KORE External EPS70 Silver</td></tr>
<tr><td></td><td colspan="2">U-Value W/m²K</td></tr>
<tr><td>100mm</td><td>0.30</td><td>0.27</td></tr>
<tr><td>120mm</td><td>0.26</td><td>0.23</td></tr>
<tr><td>150mm</td><td>0.23</td><td>0.19</td></tr>
<tr><td>175mm</td><td>0.20</td><td>0.17</td></tr>
<tr><td>200mm</td><td>0.18</td><td>0.15</td></tr>
<tr><td>250mm</td><td>0.15</td><td>0.12</td></tr>
<tr><td>300mm</td><td>0.12</td><td>0.11</td></tr>
</table>
</td></tr>
<tr><td>Floors</td><td>100mm screed on 175mm KORE Floor EPS70 Silver (0.031W/mK)</td><td>
U-Value Calculations: KORE Floor EPS70 Silver (0.031W/mK) & KORE Floor EPS100 Silver (0.031W/mK)
<table>
<tr><th>Insulating Thickness (mm)</th><th colspan="6">Perimeter/Area (m²)</th></tr>
<tr><td></td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td></tr>
<tr><td colspan="7">U-Value W/m²k</td></tr>
<tr><td>50</td><td>0.21</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td></tr>
<tr><td>75</td><td>0.18</td><td>0.22</td><td>0.24</td><td>0.25</td><td>X</td><td>X</td></tr>
<tr><td>100</td><td>0.16</td><td>0.19</td><td>0.20</td><td>0.21</td><td>0.21</td><td>0.22</td></tr>
<tr><td>125</td><td>0.14</td><td>0.16</td><td>0.17</td><td>0.18</td><td>0.18</td><td>0.19</td></tr>
<tr><td>150</td><td>0.12</td><td>0.14</td><td>0.15</td><td>0.16</td><td>0.16</td><td>0.16</td></tr>
<tr><td>175</td><td>0.11</td><td>0.13</td><td>0.13</td><td>0.14</td><td>0.14</td><td>0.14</td></tr>
<tr><td>200</td><td>0.10</td><td>0.12</td><td>0.12</td><td>0.12</td><td>0.13</td><td>0.13</td></tr>
<tr><td>250</td><td>0.09</td><td>0.10</td><td>0.10</td><td>0.10</td><td>0.11</td><td>0.11</td></tr>
<tr><td>300</td><td>0.08</td><td>0.08</td><td>0.09</td><td>0.09</td><td>0.09</td><td>0.09</td></tr>
</table>
</td></tr>
<tr><td>Roof</td><td>200mm KORE Lock EPS70 Silver + 100mm KORE Warmsark EPS100 Silver - 0.11W/m2K</td><td>
200mm KORE Lock EPS70 Silver + 100mm KORE Warmsark EPS100 Silver - 0.11W/m²K
<table>
<tr><th>KORE Solution</th><th>Thermal Conductivity</th></tr>
<tr><td>EPS70 Silver</td><td>0.031W/mK</td></tr>
<tr><td>EPS100 Silver</td><td>0.031W/mK</td></tr>
</table>
</td></tr>
<tr><td>Windows & Doors</td><td>Munster joinery Eco clad triple glazed windows. Argon filled. Soft coat Low E. U value 0.7.</td><td></td></tr>
<tr><td>Air Tightness</td><td>Proclima Intello plus membrane to under side of ceiling joists at roof. Continued to external wall and bonder to gypsum hard coat plaster coat on blockwork. External wall to have 50x50 softwood battens fixed to wall to provide service zone. Infill with 50mm mineral wool. 12.5mm</td><td>
</td></tr>
</table>

	plaster board and skim on battens.	
MVHR	Vent Axia Kinetic Plus E with rigid ducting.. Specific Fan power 0.74. Efficiency 80%	
Heat Pump	Dimplex A8MX	
Cylinder	250L A class Dimplex Cylinder	

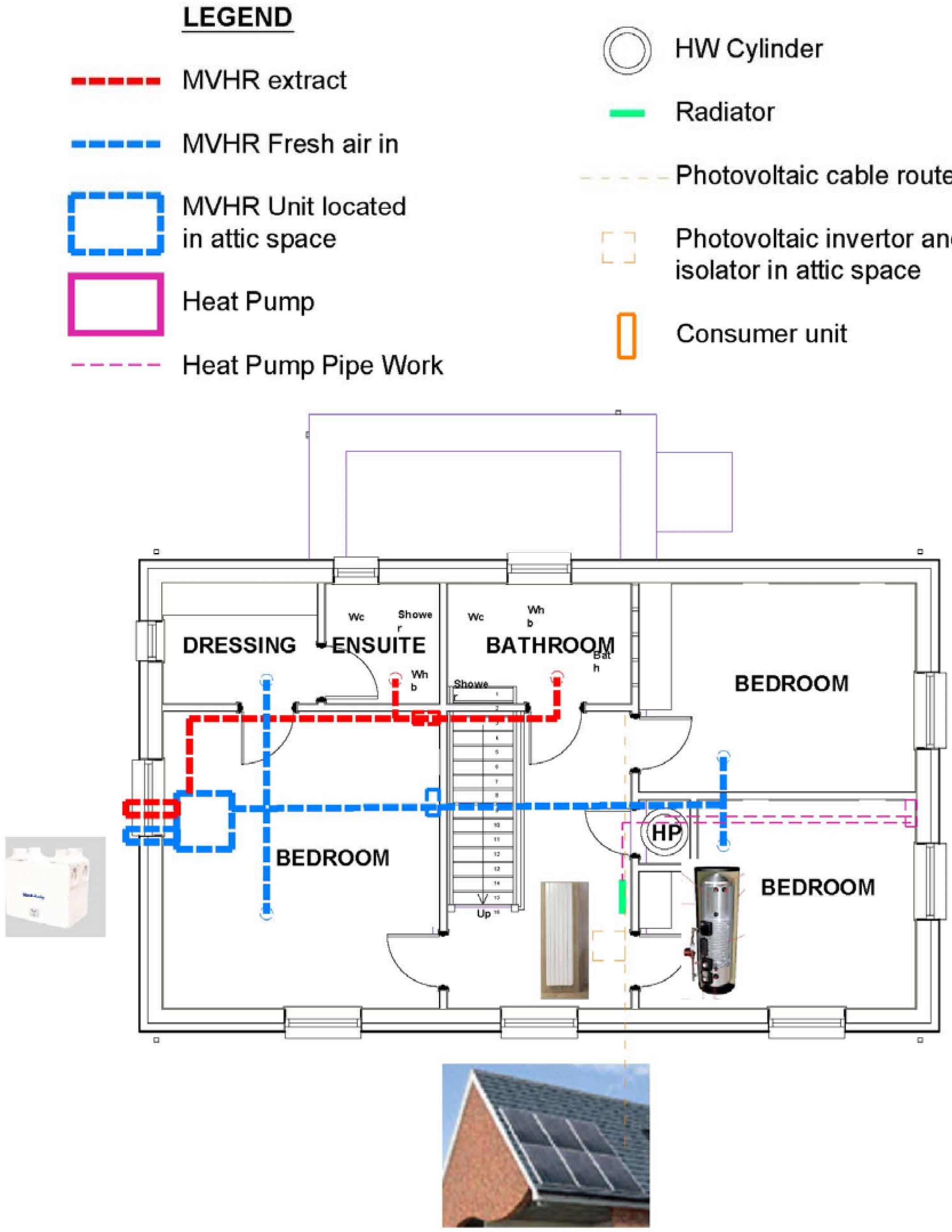
Radiators	Quinn QV 1043W Heat output 559W. 4no. required Radiators to be placed in main living and circulation areas.	
PV panels	Dimplex DXPV230/230/2/5. 10 panel array. Invertor, generation meter, roof mounting panels, cabling. 16.8m2.	

See Appendix for more detail on specifications.

Schematics:



Schematic Ground Floor



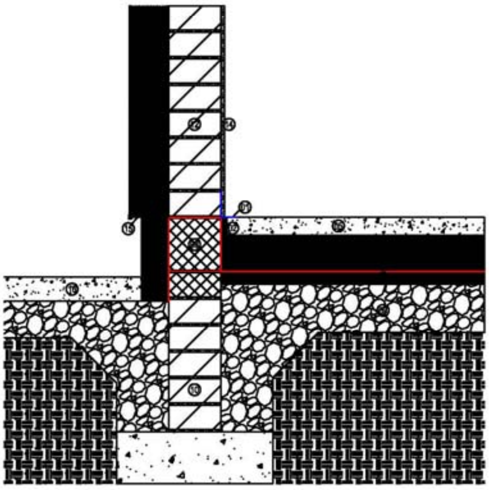
Schematic First Floor

APPENDIX A1 Aecom Specification

Element	Specification
External Wall U Value(W/m2K)	0.13
Floor U-value (W/m².K)	0.14
Roof U-value (W/m².K)	0.11
Windows and glazed doors U-value	0.9 W/m².K
Window type	Triple glazed, low E (En = 0.05, soft coat), argon filled, PVC
Windows and glazed doors g-value	0.6
External door U-value (W/m².K)	1.5
Thermal Bridging Y-value	0.05
Thermal mass	Medium
Air Permeability (m³/hm² @ 50Pa)	5
Ventilation strategy	Natural ventilation with intermittent extract fans in wet rooms
Space heating and hot water system	Mains gas condensing gas boiler, room sealed, flue fan
Heating system efficiency	91.3%
Secondary space heating system	None
Controls	Boiler interlock; Time and temperature zone control
Central heating pump	High efficiency pump (energy consumption of 52kWh/yr)
Hot water demand	Based on floor area; 1 shower with 6 litres/min flow restrictor 1 Bath; No electric showers; Overall target of 125 litres/person/day
Hot water cylinder size	120 litres; 100mm factory insulated
Lighting	100% low energy lighting, conforming to the following specification: · A+ Rated Bulbs; · 94 lumen/cW; · 4 W/m2
PV panels	Orientation - East/ West; Tilt -30; over-shading – none; 1.15KWp

Typical Construction & U-Value Calculations

Detail 2: Solid Blockwork Wall - Solid Block Wall, Plasterboard and Skim Internal Finish, External Insulation Application



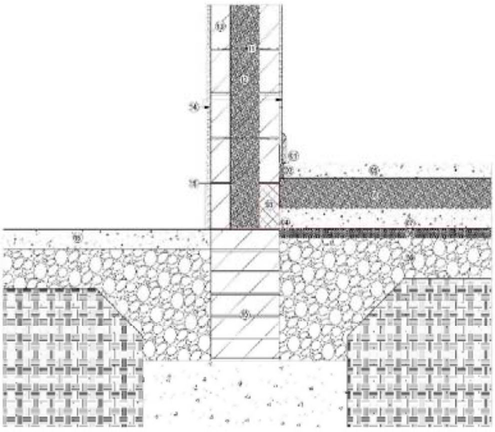
1. Junctions to be taped with airtight tape to ensure air tightness levels are achieved
2. 50mm KORE Floor Perimeter insulation with min U-value of 0.75 W/m²k
3. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk) AAC block to be suitable for use in foundations in all conditions. Block to be installed so to avoid any effect of moisture on thermal conductivity
4. Radon membrane to be lapped over AAC block and sealed to radon barrier below with radon resisting sealing tape to avoid rising moisture
5. Concrete floor to engineers specifications and details
6. 150mm KORE Floor insulation
7. Radon barrier laid to manufacturers specifications and details
8. 50mm sand blinding
9. Compacted hardcore
10. Foundations and rising walls to Structural Engineers specifications and details
11. Ensure KORE External insulation is installed to 200mm minimum below top of floor level
12. 215mm solid concrete block wall with KORE External insulation
13. KORE External insulation adhered to wall with adhesive mortar and external rendering system consisting of a high polymer base coat, reinforcing mesh, silicone primer and silicone render
14. 15mm internal sand cement render (internal includes airtight parge coat
15. Galvanised steel base rail with expansion fixings
16. Footpath

New Buildings		
	Plasterboard, Solid Blockwork, Insulation, Render	
Insulation	KORE External EPS70 White	KORE External EPS70 Silver
	U-Value W/m²K	
100mm	0.30	0.27
120mm	0.26	0.23
150mm	0.23	0.19
175mm	0.20	0.17
200mm	0.18	0.15
250mm	0.15	0.12
300mm	0.12	0.11

Wall Specification

Typical Construction & U-Value Calculations

Detail 2: Solid Concrete Ground Floors - Insulation Below the Floor Screed



1. Junctions to be taped with air tightness tape to ensure air tightness levels are achieved
2. 50mm KORE Floor Perimeter Insulation with min U-value of 0.75 m2k/W
3. Autoclaved aerated concrete (AAC) block to be used to ensure thermal break is maintained. (maximum thermal conductivity of 0.20 W/mk) AAC block to be suitable for use in foundations in all conditions. Block to be installed so to avoid any effect of moisture on conductivity
4. Radon membrane to be lapped over AAC block and sealed to radon barrier below with radon resisting sealing tape to avoid rising moisture
5. Concrete floor screed to engineers specifications and details
6. 150mm KORE Floor Insulation
7. Radon barrier on 50mm sand blinding and installed to TGD-C
8. 50mm sand blinding
9. Compacted hardcore
10. Foundations and rising walls to Structural Engineers specifications and details
11. Wall ties to manufacturers specifications and details
12. 150mm KORE Fill Bonded Bead Insulation to be installed 225mm below top of floor level
13. 350mm cavity wall: -100mm concrete block outer leaf, 150mm cavity and 100mm concrete block inner leaf
14. 24mm external and 15mm internal sand cement render (internal includes airtight parge coat)
15. DPC level minimum of 150mm from ground level
16. Footpath

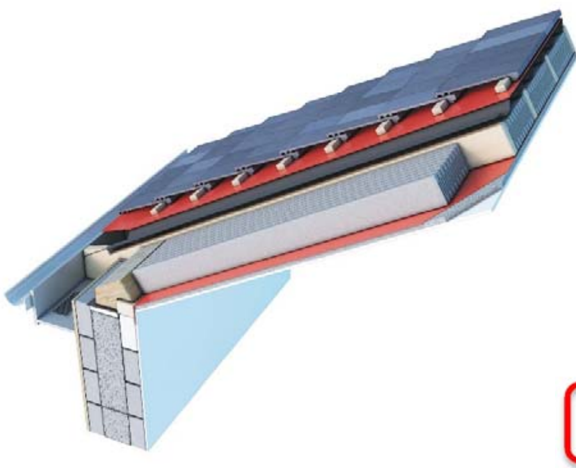
U-Value Calculations: KORE Floor EPS70 Silver (0.031W/mK) & KORE Floor EPS100 Silver (0.031W/mK)

Insulating Thickness (mm)	Perimeter/Area (m²)					
	0.2	0.3	0.4	0.5	0.6	0.7
	U-Value W/m²k					
50	0.21	X	X	X	X	X
75	0.18	0.22	0.24	0.25	X	X
100	0.16	0.19	0.20	0.21	0.21	0.22
125	0.14	0.16	0.17	0.18	0.18	0.19
150	0.12	0.14	0.15	0.16	0.16	0.16
175	0.11	0.13	0.13	0.14	0.14	0.14
200	0.10	0.12	0.12	0.12	0.13	0.13
250	0.09	0.10	0.10	0.10	0.11	0.11
300	0.08	0.08	0.09	0.09	0.09	0.09

Floor Specification

KORELOCK

nZEB-Ready
Cold & Warm Pitched Roof Insulation



Meet & Exceed nZEB Requirements

KORE Lock insulation has been designed to meet and exceed the U-value requirements of Part L 2018:

Cold Roof Solution:
100mm KORE Lock EPS70 Silver + 50mm KORE Thermal Board EPS70 Silver - 0.16W/m²K

Warm Roof Solution
170mm KORE Lock EPS70 Silver + 50mm KORE Thermal Board EPS70 Silver - 0.16W/m²K

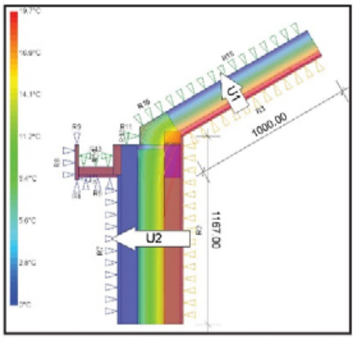
Looking for Passive Values?
200mm KORE Lock EPS70 Silver + 100mm KORE Warmsark EPS100 Silver - 0.11W/m²K

KORE Solution	Thermal Conductivity
EPS70 Silver	0.031W/mK
EPS100 Silver	0.031W/mK

Why Choose KORELOCK

KORE Lock is an insulation system for use in warm and cold pitched roof applications. The unique cut of KORE Lock allows the product to be compressed slightly for easy installation between the rafters.

- KORE Lock insulates with air, not gas
- KORE Lock has variable width adjustment for easy installation
- Compliance with building regulations, including nZEB, is simple
- The thermal performance of KORE Lock will not diminish over time
- KORE Lock easily facilitates all roof ventilation requirements.



Psi Value - 0.075W/(mK)
fRsi Value - 0.91

Airpacks Ltd
The Green, Kilnaleck, Co. Cavan
A82 T291

www.kore-system.com

Roof Specification

INTELLO® PLUS

High-performance reinforced intelligent vapour check
Suitable for all fibrous insulation mats and boards

CE
07
EN 13984

iab
Bord Agrément na hÉireann
Irish Agrément Board

Technical Data:

Material	Product	
fleece	fleece PP microfiber fleece	
membrane	polyethylene copolymer	
reinforcement	PP	
Characteristic	**Test standard**	**Value**
colour	-	white-transparent
surface weight	DIN EN 1849-2	110 g/m²
temperature resistance	-	-40°C to +80°C
μ	DIN EN 1931	37,500
thickness	DIN EN 1849-2	0.2 mm
mvtr-value mean / humidity variable	DIN EN 1931	37.5 MNs/g / 1.25-50 MNs/g
fire class	DIN EN 13501-1	E
fire safety classification	VKF	5.3
nail tear resistance	DIN EN 12311-2	350 N/5 cm / 290 N/5 cm
tensile strength MD / XD	DIN EN 12311-2	15 % / 15 %
nail tear-out resistance MD / XD	DIN EN 12311-2	240 N / 200 N
durability	EN 1296 / EN 1931	passed

Carries the CE mark in accordance with DIN EN 13984.

Applications:

Can be used as a vapour check and airtightness membrane for all externally diffusion-open structures, e.g. with roof underlay (pro clima SOLITEX), softwood fibreboard or MDF board. For a high level of protection against moisture induced failures in structurally challanging constructions such as diffusion-resistant flat/pitched roofs. Also suitable in extreme environments such as in high mountain regions. Further information is given in the study "Calculating potential freedom from structural damage of thermal insulation structures in timber-built and steel systems"

Delivery Form:

Mat. No.	EAN	Roll length	Roll width	Roll area	Roll weight	PU	PU/Pallet
10093	4026639011237	20 m	1.50 m	30 m²	4.5 kg	1	42
10092	4026639011244	50 m	1.50 m	75 m²	10 kg	1	20
10076	4026639011992	50 m	3.00 m	150 m²	18 kg	1	20
12222	4026639122223	50 m	3.00 m (folded in 1.60 m)	150 m²	18 kg	1	20

Features/advantages:

The all-rounder amongst vapour checks with an especially high mvtr-value in any climate, with an effective variability of the diffusion resistance ranging from 1.25 MNs/g up to over 50 MNs/g. In the winter it has a higher diffusion resistance => higher protection against moisture, in the summer it has a lower diffusion resistance => extremely high level of drying = maximum protection against structural damage. Suitable for all fibrous insulating materials.

- ✔ Maximum protection for the insulation
- ✔ Ideal prevention against structural damage and mould, even in the event of unexpected moisture intrusion
- ✔ Extremely high humidity-variable diffusion resistance in any climate spanning a very wide range (x40)
- ✔ mvtr-value > 50 MNs/g in a winter climate
- ✔ mvtr-value = 1.25 MNs/g back-diffusion capacity in summer
- ✔ Very low coefficient of expansion when used with blown insulation

System Products:

TESCON VANA: adhesive tape; TESCON No.1: adhesive tape; ORCON F: joint adhesive glue

The information provided here is based on practical experience and the current state of knowledge. We reserve the right to make changes to the recommendations given or to make alterations due to technical developments and associated improvements in the quality of our products. We would be happy to inform you of the current technical state of the art at the time you use our products.

Further information about application and construction is given in the pro clima planning documentation and application recommendations. If you have any questions, please call the pro clima technical hotline Ireland and UK:
Phone: +353 46 9432104
Fax: +353 46 9432435
info@ecologicalbuildingsystems.com

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pro clima®

MOLL bauökologische Produkte GmbH Rheintalstraße 35 - 43, 68723 Schwetzingen, Germany www.proclima.com

2010-04 ID XXXXX

Air Tightness Membrane

Lo-Carbon Kinetic Plus E

- Lightweight for easy installation
- Easy access filters
- External condensate connection
- Compatible with a range of controls: PIR, Humidistat
- Horizontal duct option for space-saving installations
- Up to 94% heat recovery
- Summer mode
- Manufactured in the UK
- Switched live inputs (light switch control)

A wholehouse heat recovery system with up to 94% energy efficiency. An easily accessible heat recovery cube protected by two removable ISO 45% Coarse (G3) Filters. Two Lo-Carbon Energy Saving EC/DC fans ensure long life (typically over double the life of AC motors) and lowest possible energy use. Fully insulated construction with built-in condensation drain.

Lo-Carbon Kinetic Plus E meets the latest requirements of the Building Regulations Approved Document F for wholehouse system ventilation.

The Lo-Carbon Kinetic Plus E model has two adjustable speeds, normal and boost. A third fixed speed is available to provide maximum flow (Purge). On the front of the unit is the controller that can be used to preset the speeds to any required performance, up to 111l/s (400m^3/hr) 150Pa. Offering 'Close Control' to prevent over ventilating. Acoustically lined - low noise levels from only 20dB(A) @ 3m.

Left or Right Hand Installation

Units are supplied right handed with duct spigots to outside on the right hand side. These can be reversed onsite by simply removing the control panel, rotating the unit 180 degrees and reattaching the control panel.

Spigot Options

The combination of spigot options allows installation in confined locations. If vertical and horizontal connections are required on the same outlet/inlet, additional spigots can be supplied.

Filter Check

An LED on the control panel illuminates at 6 month intervals to remind users to check and clean the filters.

Frost Protection

The Kinetic E range benefits from an automatic frost protection system to prevent the heat recovery cell freezing in very cold weather, while at the same time maintaining ventilation.

Control Options

There are two LS (Switched Live) inputs allowing the unit to be connected to a number of sensors and controllers such as Ventwise, Timespan, Ambient Response Humidistat. One of the LS connections also benefits from a 'Delay-On' feature which prevents the unit boosting unnecessarily. Switching on the control panel allows activation of the Summer Mode.

Model

Model	Stock Ref
Kinetic Plus E	449059

Accessories

Model	Stock Ref
ISO 45% Coarse (G3) Filter 2pk	403702
ISO ePM10 50% (M5) Filter 2pk	444201
Isolator Relay Controller	442030
180mm/200mm Spigot Kit (One per pack)	446523

SAP PCDB Test Results

Exhaust Terminal Configuration	Thermal Efficiency %	SFP (W/l/s)
K + 1	94	0.41
K + 2	94	0.40
K + 3	94	0.43
K + 4	94	0.45
K + 5	93	0.52
K + 6	93	0.61
K + 7	93	0.73

SEC Class

Model	SEC Class
Kinetic Plus E	A+

A-Class Heat Pumps

Dimplex Heat Pump Manufacturing

Dimplex has been producing heat pumps for 30 years in manufacturing plants throughout Ireland, France and Germany. The A-Class heat pump from Dimplex is designed and developed in Dunleer, Co. Louth and manufactured in Newry, Co. Down. It is specifically designed for the Irish climate and to help meet our building regulations which are some of the most challenging in Europe.

Why choose a Dimplex A-Class heat pump?

✓ Helps meet building regulations

✓ Saves the builder and the homeowner money

✓ High energy ratings

✓ Hot water production without the need for an immersion

✓ Works with radiators, underfloor heating and Dimplex SmartRad

✓ Easy to use controls

✓ Easy to install

✓ Life expectancy is twice that of a regular boiler

Heat Pump

A-Class heat pump cylinders

Unvented stainless steel cylinders for heat pumps

Sustainable material

- Inner vessel manufactured from premium grade Duplex stainless steel
- Lightweight yet ultra-high strength and stress/corrosion resistant, ensuring long cylinder life
- 25-year warranty
- Outer cladding produced from 100% recycled material
- Hard wearing, flexible and damage resistant
- High proportion of materials (excluding insulation) by volume recycled

Environmentally sound performance

- Side hot water draw off connection, minimises heat losses through the top of the cylinder
- 60mm of injected polyurethane foam insulation, CFC/HCFC free
- Best practice standards for low heat loss and heat recovery
- Completely void free, including insulation around immersions and thermostats
- Recessed immersion heater and thermostat housings reduce heat loss
- Large surface area coil for use with A-Class heat pumps

25-year cylinder guarantee

Superior operational performance

- A-Class controller mounted on cylinder
- 210 or 250 litre of continuous hot water
- 40 litre buffer built in
- High flow rates for efficient hot water delivery
- Powerful showers and fast filling baths
- Corrugated coil construction maximises surface area while maintaining high usable volume

- Light and easy to handle for easy installation
- Surface-mounted thermostats and sensors all pre-wired with no pockets
- Supplied complete with inlet safety group and external expansion vessel
- All connections accessible from the front

Hot Water Cylinder

SLIEVE **VERTICAL** technical information

design
radiators

The SLIEVE is the ultimate example of a radiator that not only optimally heats a space; it also ensures a unique decorative look.

This delightful design is available in many sizes, so it can be incorporated in any design project.

The Slieve is the ideal alternative to the standard panel radiator.

The base colour is RAL 9016, but thanks to the flexibility of our ultramodern coating process, we offer you a wide selection of Quinn Standard Colours. We can also cater for on demand or defined project work for colours within RAL and BS classifications.

Included with the original design of these radiators, Quinn also offers unrivalled quality.

Our radiators are tested at nationally and internationally acknowledged laboratories and are accredited in accordance with BS EN442, CE, NF and Kite mark.

Quality assurance is backed with Quinn 10-year warranty! (See terms and conditions)

WARRANTY 10 YEARS GARANTIE

Quinn Standard Colours

* Coulours and photos under reserve (may vary due to printing methods, model ordered, ..)
For more information don't hesitate to contact your wholesaler or info@quinn-radiators.net

BS EN 442 KM507661 EN 442 EURONORM NF CE ISO 9001 FM507683 DIN

QUINN radiators

SLIEVE VERTICAL

design radiators

Type 10

Height	Length	Heat-output W ΔT50 (75/65/20°C)	SKU	Water-content	Dry weight
1600	288	559	QV1043W	4,13	13,28
	433	811	QV1044W	6,53	19,92
	505	933	QV1016W	7,68	23,24
	578	1056	QV1017W	8,98	26,56
1800	288	625	QV1045W	4,64	14,80
	433	906	QV1013W	7,34	22,20
	505	1042	QV1022W	8,64	25,90
	578	1178	QV1014W	10,1	29,60
	650	1311	QV1023W	11,52	33,30
	795	1576	QV1024W	13,61	40,70
2000	288	690	QV1001W	5,16	16,32
	433	1000	QV1002W	8,16	24,48
	505	1151	QV1012W	9,6	28,56
	578	1302	QV1004W	11,22	32,64
	650	1449	QV1003W	12,8	36,72
	723	1596	QV1005W	13,68	40,8
	795	1740	QV1026W	15,12	44,88

Vertical panels

Length	N° of elements
288	4
360	5
433	6
505	7
578	8
650	9
723	10
795	11
868	12

Type 20

Height (mm)	Length (mm)	Heat-output W ΔT50 (75/65/20°C)	SKU	Water-content (Litre)	Dry weight (kg)
1600	505	1440	QV2006W	13,60	44,03
	578	1627	QV2007W	16,26	50,32
	650	1810	QV2008W	18,88	56,61
1800	288	963	QV201828W	8,80	27,93
	360	1179	QV201836W	10,83	35,15
	433	1394	QV2036W	13,16	42,18
	505	1603	QV2012W	15,30	49,21
	578	1811	QV2013W	18,29	56,24
	650	2014	QV2014W	21,24	63,27
	723	2218	QV2015W	23,78	70,30
	795	2418	QV2016W	26,26	77,33
	868	2626	QV2017W	28,80	84,36
2000	288	1061	QV2001W	9,54	31,12
	360	1299	QV202036W	12,03	38,90
	433	1535	QV2002W	14,62	46,68
	505	1765	QV2018W	17,00	54,46
	578	1994	QV2004W	20,32	62,24
	650	2218	QV2003W	23,60	70,02
	723	2443	QV2005W	26,42	77,80
	795	2662	QV2019W	29,18	85,58
	868	2891	QV2020W	32,00	93,36
2200	578	2177	QV2022W	22,35	65,12
	650	2421	QV2023W	25,96	73,26
	723	2666	QV2024W	29,06	81,40
	868	3156	QV2026W	35,20	97,68

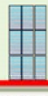
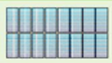
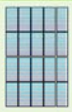
Type 20 MC with grille

Height (mm)	Length (mm)	Heat-output W ΔT50 (75/65/20°C)	SKU	Water-content (Litre)	Dry weight (kg)
1800	288	944	QV2018288WMC6KD	8,59	28,12
	433	1366	QV2018433WMC6KD	13,16	42,18
	578	1775	QV2018578WMC6KD	18,29	56,24
	723	2174	QV2018723WMC6KD	23,78	70,30
	868	2573	QV2018868WMC6KD	28,80	84,36
2000	288	1040	QV2020288WMC6KD	9,54	31,12
	433	1504	QV2020433WMC6KD	14,62	46,68
	578	1954	QV2020578WMC6KD	20,32	62,24
	723	2394	QV2020723WMC6KD	26,42	77,80
	868	2833	QV2020868WMC6KD	32,00	93,36
2200	288	1135	QV2022288WMC6KD	10,49	32,56
	433	1642	QV2022433WMC6KD	16,08	48,84
	578	2133	QV2022578WMC6KD	22,35	65,12
	723	2613	QV2022723WMC6KD	29,06	81,40
	868	3093	QV2022868WMC6KD	35,20	97,68

QUINN radiators

Radiators

Standard kits available

Product Code	PV Array output (kWp)	Surface Area (m^2)	Number of modules	Rows	Columns	Electrical Configuration	Panel Layout
DXPV138/230/2/3	1.38	10.08	6	2	3	Single String	
DXPV184/230/2/4	1.84	13.44	8	2	4	Single String	
DXPV207/230/3/3	2.07	15.06	9	3	3	Single String	
DXPV230/230/2/5	2.3	16.8	10	2	5	Single String	
DXPV276/230/2/6	2.76	20.16	12	2	6	Single String	
DXPV276/230/3/4	2.76	20.16	12	3	4	Single String	
DXPV276/230/4/3	2.76	20.16	12	4	3	Single String	
DXPV345/230/3/5	3.45	25.2	15	3	5	Single String	
DXPV368/230/2/8	3.68	26.88	16	2	8	2 strings	
DXPV368/230/4/4	3.68	26.88	16	4	4	2 strings	
DXPV414/230/3/6	4.14	30.4	18	3	6	2 strings	
DXPV460/230/2/10	4.6	33.6	20	2	10	2 strings	
DXPV460/230/4/5	4.6	33.6	20	4	5	2 strings	
DXPV552/230/4/6	5.52	40.32	24	4	6	2 strings	

Maintenance

When a Dimplex solar PV kit is installed in a home or a business it has to be installed by a professionally qualified installer approved under the Microgeneration Certification Scheme, such as a Dimplex Accredited Installer. The installer notifies the electricity provider to make them aware that the system has been installed and that electricity is being generated, some of which will be exported back to the grid. As part of the installation work, a clear wiring diagram will be mounted close to the system for future reference.

Roof mounted solar PV modules have no moving parts and problems very rarely arise, but the warranty information provided with the kit details what steps need to be taken should this unlikely event occur. The inverter should be inspected annually and isolators are provided to enable the system to be shut down safely.

Dimplex solar PV kits are supported by a network of Accredited Installers and a team of customer service personnel.

Warranty

Dimplex solar PV modules carry a product warranty of 5 years with a guaranteed performance of 90% after 10 years and 80% after 25 years, with an expected life of around 30 years. Inverters carry a 5 year warranty

Approvals

Dimplex solar PV kits are tested by leading international institutes and certified for reliability and safety:

- Certified to IEC61215
- Certified to IEC61730
- CE conformity
- MCS