Project Documentation

1.0 Abstract |

Two storey housing with 11 one bedroom apartments,

St. Bricin's Park, Block 2, Arbour Hill, Dublin 7, Ireland

1,1 Data of building

Data of building | Gebäudedaten			
Year of construction	2018-19	**Space heating** **Heizwärmebedarf**	**21** **kWh/(m²a)**
U-value external wall	0,145 W/(m²K)		
U-value floor	0.349 W/(m²K)	Primary Energy Renewable (PER)	58 kWh/(m²a)
U-value roof	0,098 W/(m²K)	Generation of renewable Energy	0 kWh/(m²a)
U-value window	0.89 W/(m²K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	127 kWh/(m²a)
Heat recovery	75 %	Pressurization test n_{50} Drucktest n_{50}	0.6 h^{-1}
Special features			

Brief Description

Passive House EnerPHit Project at St Bricin's Park, Block 2, Dublin.

This terraced housing is the first EnerPHit Passive House building to be carried out by Dublin City Council.

The building formerly housed 22 bedsit dwellings and these were converted into 11 one bedroom dwellings for senior citizens. The individual apartments have an average floor area of 57.3m² at ground floor and 58.9m² at first floor with identical floor layouts. The Living and Bedrooms have a south westerly facing orientation. The existing construction is masonry with concrete, block and brick solid construction. The buildings were stripped back to the original fabric and built back to achieve a high standard of fabric. Some solid concrete eaves and overhangs had to be removed to eliminate a large potential cold bridge.

A minimal amount of insulation was fitted to the existing ground floor slab due to the restricted height and need to achieve a minimum floor to ceiling height. The external walls were externally insulated with Rockwool to achieve both thermal and fire safety performance. The attics were insulated for the most part in traditional mineral wool with the front and back eaves insulated to achieve fabric targets and mitigate thermal bridging.

The project was a pilot project for Dublin City Council to demonstrate high performance achievable in Deep Retrofit projects. There are a number of this building type in Dublin city that could be replicated in the future.

The project achieve over 80% reduction in energy requirements and carbon reductions over the previous rating of the dwellings. Due to the diligence of the various contractors the project achieved the new build standard for airtightness a high point of the build.

Responsible project participants

Architect	James Walsh, Low Energy Design
Implementation planning	James Walsh, Low Energy Design
Building systems	Morley Walsh Consulting Engineers, 41 Lower Dominick Street, Dublin 1
Structural engineering	-
Building physics	James Walsh, Low Energy Design
Passive House project planning	James Walsh, Low Energy Design
Construction management	Westside Civil Engineering Ltd.

Certifying body

Certification ID

7152	Project-ID (www.passivehouse-database.org)

Author of project documentation

Low Energy Design	James Walsh
Date	Signature
07.02.2023	

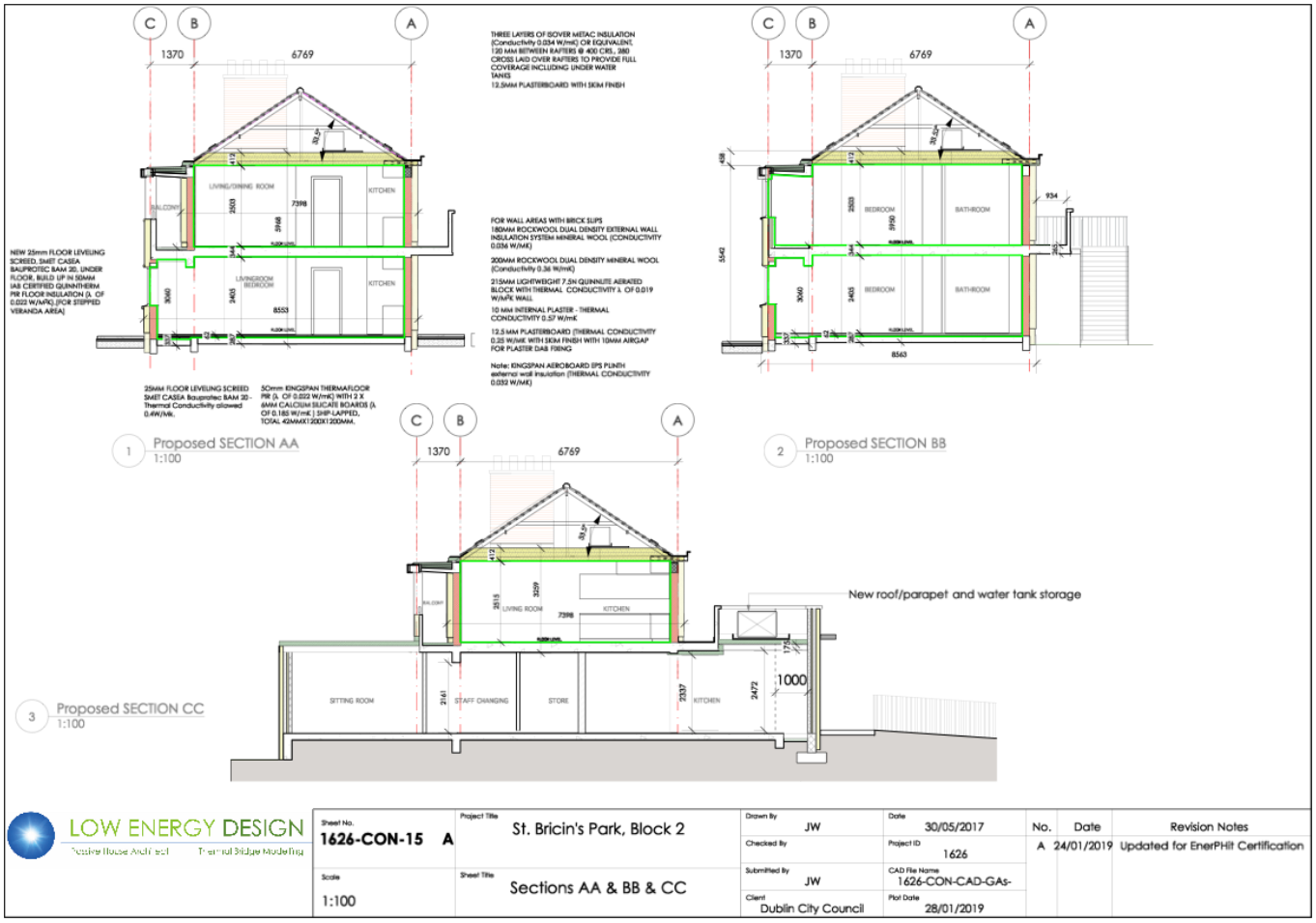
1. Photos

	
Southerly Elevation looking north westerly with Terrace outside living areas	Southerly Elevation looking south easterly direction
	
North West Corner	South East Corner

2. Interior Photos

	
Interior of Kitchen/Living	Interior of Bedroom

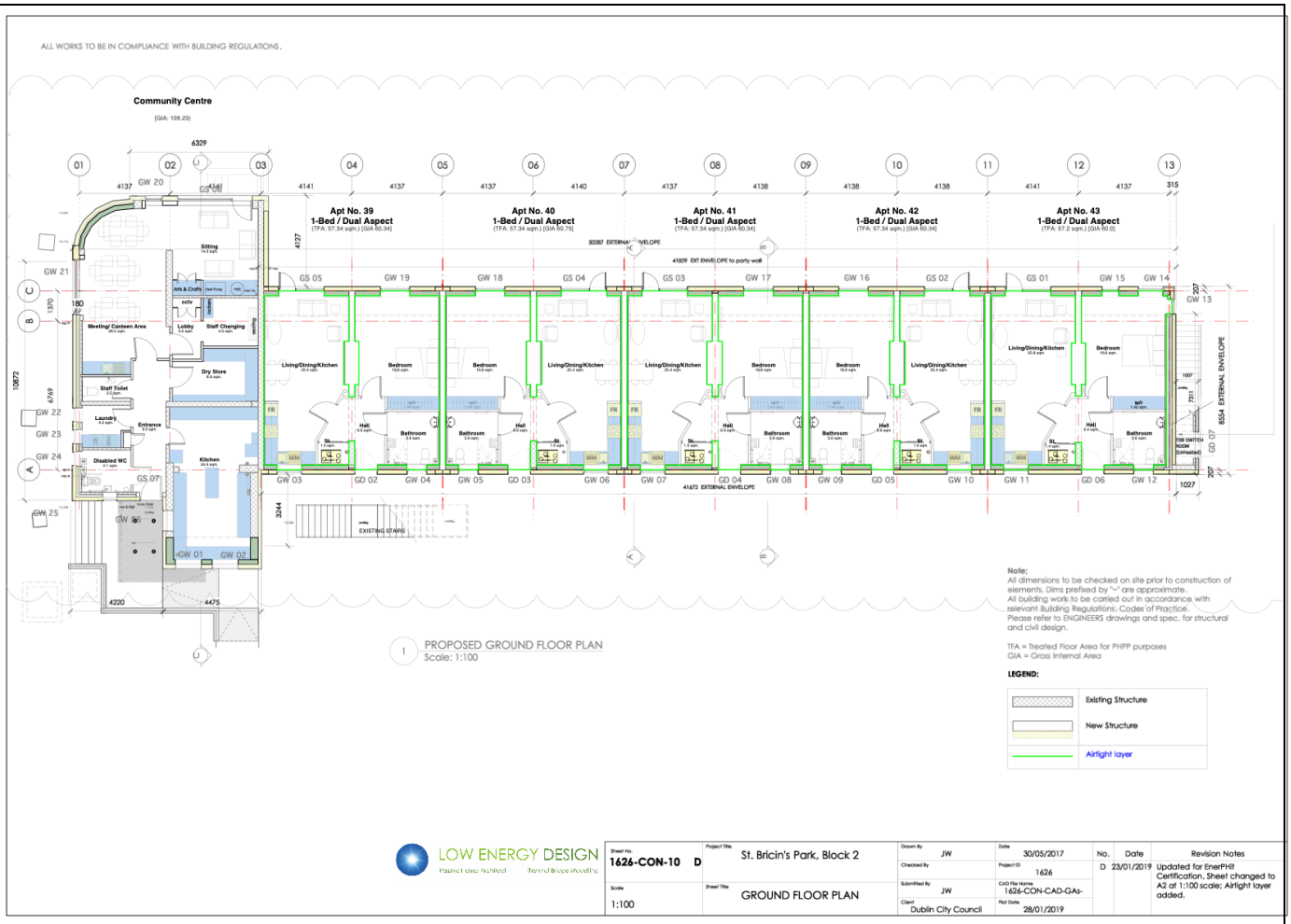
3. Sectional Drawings of the EnerPHit Building



Cross Section Drawings of Building

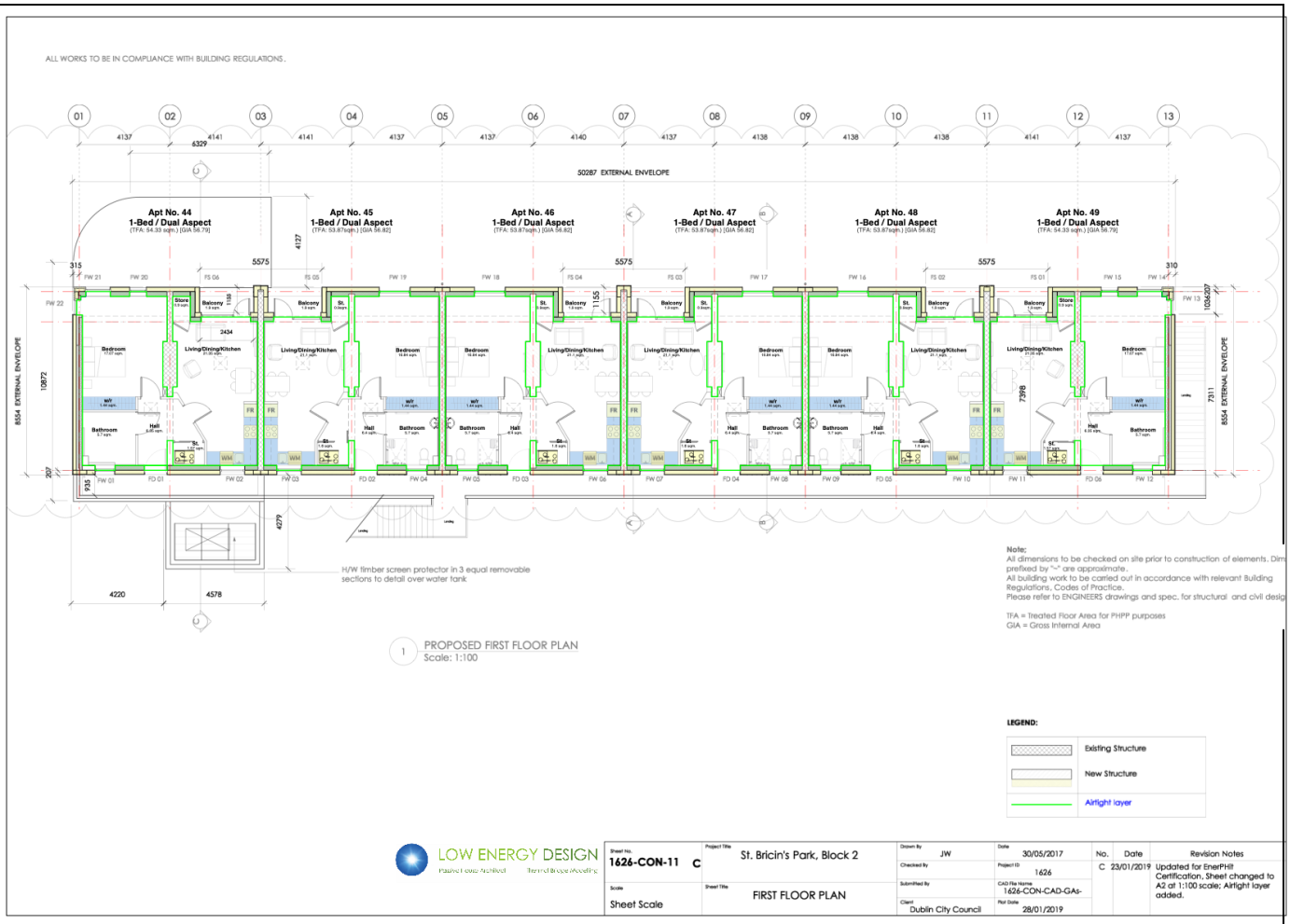
The Thermal Envelope is visible at different points in the building. The airtightness layer is also visible in a green line. One of the units sits over a Community Centre. The Kitchens and bathroom are on the North Easterly side of the building and the Living Rooms and Bedrooms are on the south westerly side of the building. The top floor has mineral wool insulation along the pitched roof ceiling level, with airtightness layer.

4. Floor Plans



Ground Floor Plan with 5 one bedroom apartments

The ground floor units are directly accessible with level thresholds. There are two external staircases with access to the upper floor deck. The Nilan Heat Pump and Ventilation Unit is fitted to an external wall so supply and extract ventilation have short runs to the external envelope.



First Floor with 6 one bedroom apartments

The first Floor dwellings are accessed from a deck via two staircases. The First Floor Apartments have an external Balcony facing south west accessed from the Living spaces. The Nilan Heat Pump and Ventilation Unit is fitted to an external wall so supply and extract ventilation have short runs to the external envelope, but also use the roof for extract and supply air rather than the external walls.

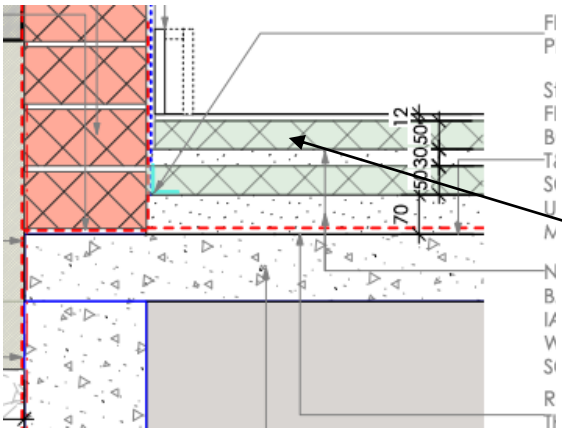
5. Construction Details of the Envelope – External Wall/Ground Floor

Insulation Log Quality Assurance Documentation

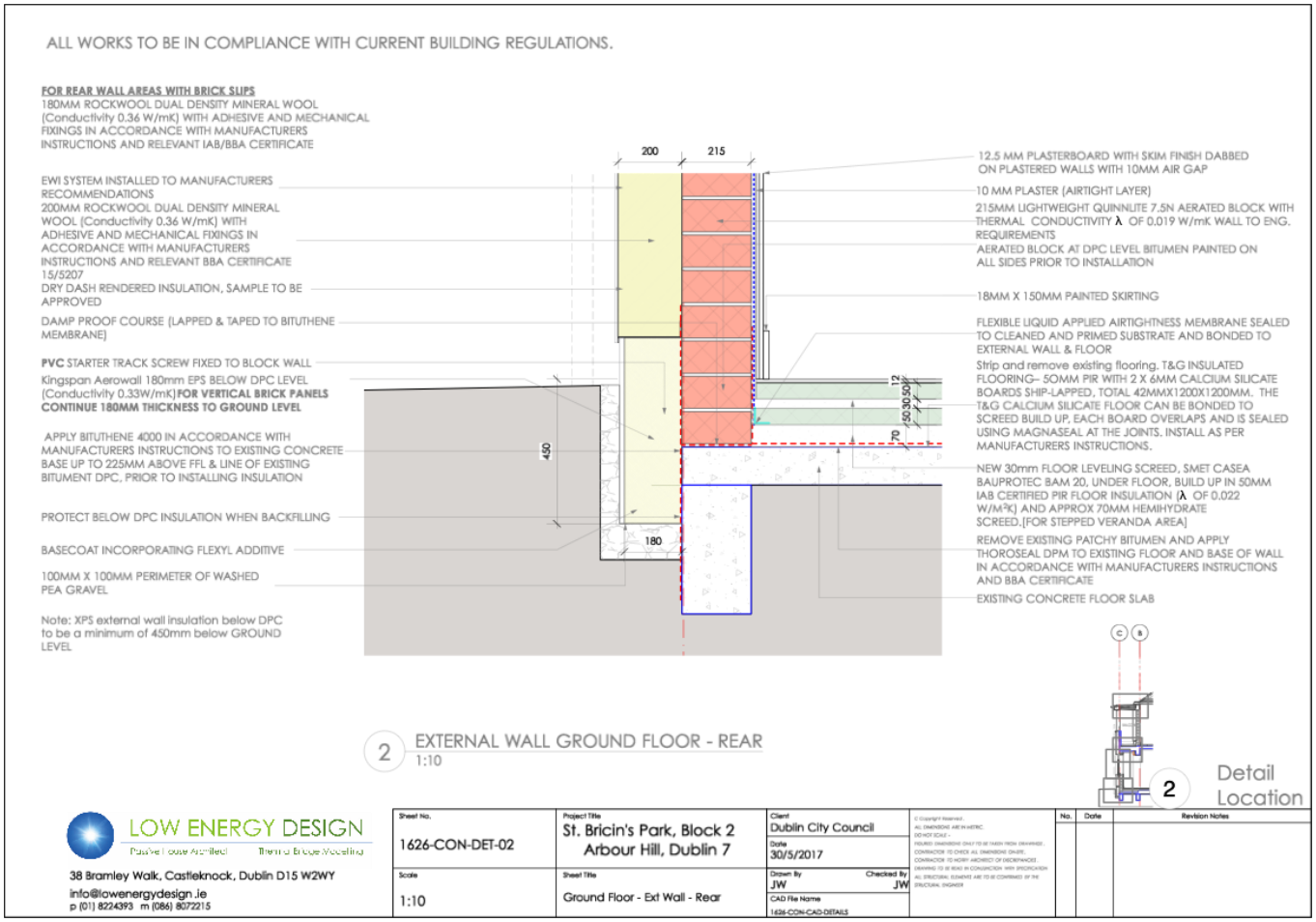
Phase 3, St Bricin's, Blk 2, Arbour Hill, D7

Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Job No:	Contractor:	Architect:
C A 1311 **SEAI Ref:** **DR17005DCC**	West side Engineering Ltd	James Walsh LOW ENERGY DESIGN
Area Photo: Ground floor	Drawing Ref: 1626-TND-DET- 02	Product info. Etherm Conductivity λ of 0.022 W/M2K Thickness – 0.050mm



The ground floor has a minimum of one layer of insulation (some areas have two at former balconies in the photo) and they are connected to thermal blocks and external wall insulation. Photos show the layers of boards fitted to the floor, the overlap of the magnesium silicate boards and the thickness of insulation.



Extract from PHPP with build up for this floor external wall detail. Note much of the ground floor has one layer of insulation and U value of 0.376 W/m^{2}K.

Assembly no.						Interior insulation?
13ud	Ground floor 2					0

Heat transmission resistance [m²K/W]

Orientation of building element: 3-Floor — interior R_{si}: 0.17

Adjacent to: 2-Ground — exterior R_{se}: 0.00

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Magnesium Silicate Board	0.185					12
Kingspan Thermafloor PIR	0.022					50
SMET Floor Screed	0.400					25
Quinntherm PIR	0.022					50
Concrete Floor Slab	2.200					200

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%	0.0%	0.0%	33.7 cm

U-value supplement: 0.00 W/(m²K)

U-value: 0.203 W/(m²K)

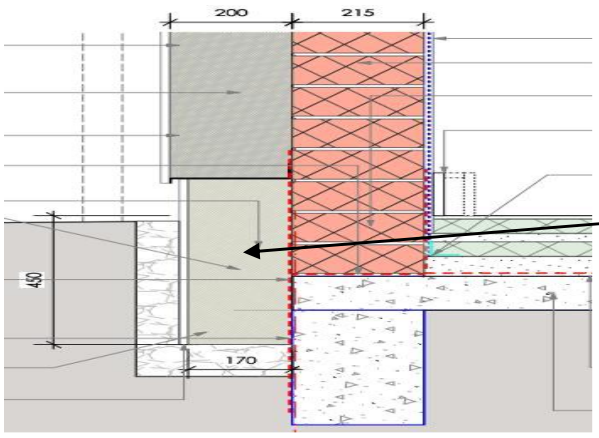
6. Construction Details of the Envelope – External Wall

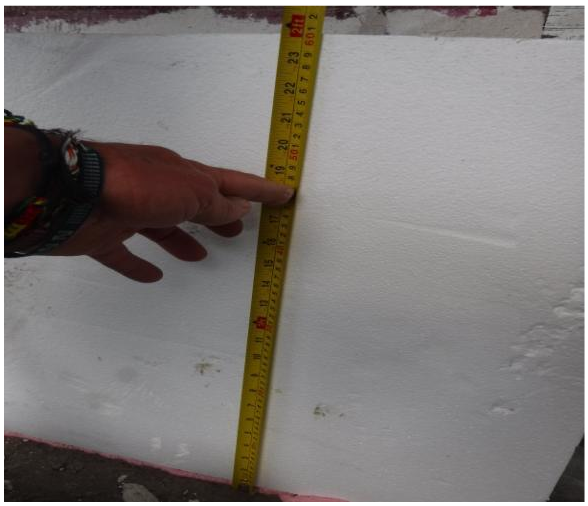
Insulation Log Quality Assurance Documentation

Phase 3, St Bricin's, Blk 2, Arbour Hill, D7

Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Job No:	Contractor:	Architect:
C A 1311 **SEAI Ref:** **DR17005DCC**	West side Engineering Ltd	James Walsh LOW ENERGY DESIGN
Area Photo: External wall ground floor - rear	Drawing Ref: 1626-TND-DET- 02	Product info. Conductivity 0.36 W/mK 0.180mm X 0.600mm





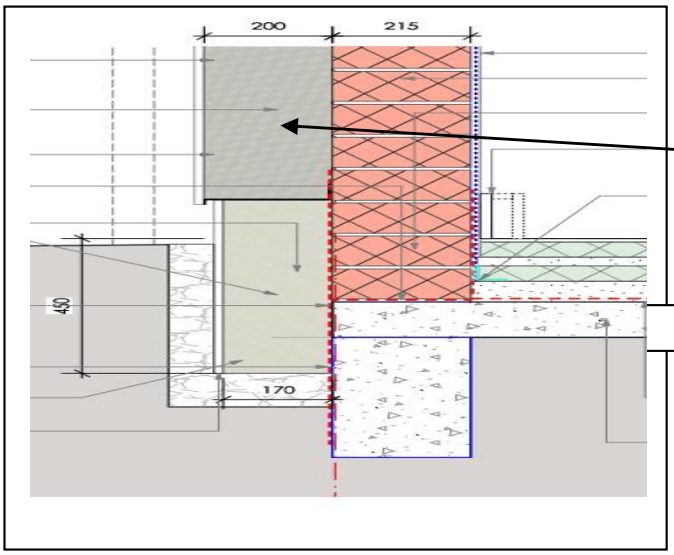
The External Wall has an EPS plinth at the perimeter of the building. (also shown on DETAIL 02 in previous pages.)

Insulation Log Quality Assurance Documentation

Phase 3, St Bricin's, Blk 2, Arbour Hill, D7

Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Job No:	Contractor:	Architect:
C A 1311 **SEAI Ref:** **DR17005DCC**	West side Engineering Ltd	James Walsh LOW ENERGY DESIGN
Area Photo: External wall ground floor - rear	Drawing Ref: 1626-TND-DET- 02	Product info. Rockwool Redart Conductivity 0.36 W/mK 0.180mm X 0.600mm



Above the plinth there is 180mm of Rockwool external insulation, with drawing and photographs. (also shown on DETAIL 02 in previous pages.). The repair blockworks is a thermal block with plasterboard and dab to the interior of the building. The external face of the insulation had render reveals at the windows and dry dash finish externally for a robust finish.

Standard Wall Build up in extract from PHPP below.

Assembly no.		Interior insulation?
02ud	Ext. Wall - Rockwool DD	0

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0.13

Adjacent to: 1-Outdoor air — exterior R_{se}: 0.04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Plasterboard	0.250					13
Airgap	0.067					10
QuinLite B7	0.190					215
Rockwool DD Slab	0.036					200
Baumit Basecoat Render	0.800					5
Baumit Render	0.700					2

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%	0.0%	0.0%	44.5 cm

U-value supplement: 0.00 W/(m²K)

U-value: 0.142 W/(m²K)

7. Construction Details of the Envelope – Roof

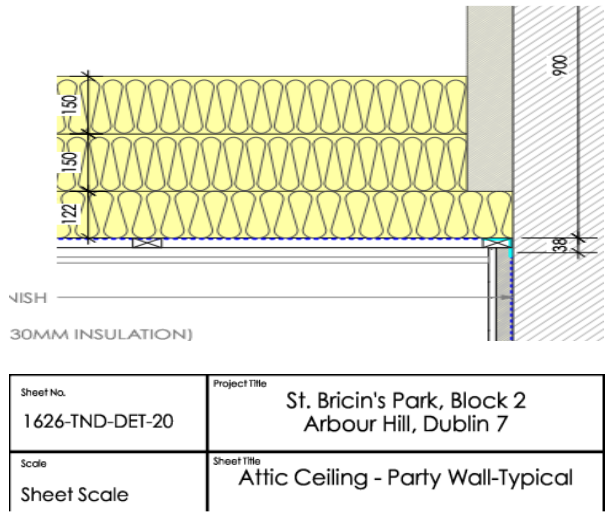
Insulation Log Quality Assurance Documentation

Phase 3, St Bricin's, Blk 2, Arbour Hill, D7

Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Job No:	Contractor:	Architect:
C A 1311 **SEAI Ref:** **DR17005DCC**	West side Engineering Ltd	James Walsh LOW ENERGY DESIGN

Area Photo:	Drawing Ref:	Product info. Saint Gobain
Directly above ceiling level/attic space.	1626-TND-DET -20	Isover Metac. 150 mm @W/(MK) 0.034



The main pitched roof flat ceiling has 400mm of mineral wool insulation fitted between ceiling joists and over. Layers are cross laid. The party walls have PIR insulation board fitted to improve the thermal performance at edges. The underside had airtightness membrane and plasterboard finish.

The Pitched Roof Flat Ceiling extract of the build up in PHPP.

Assembly no.						Interior insulation?
07ud	Flat Ceiling					0

Heat transmission resistance [m²K/W]

Orientation of building element: 1-Roof — interior R_{si}: 0.10

Adjacent to: 3-Ventilated — exterior R_{se}: 0.10

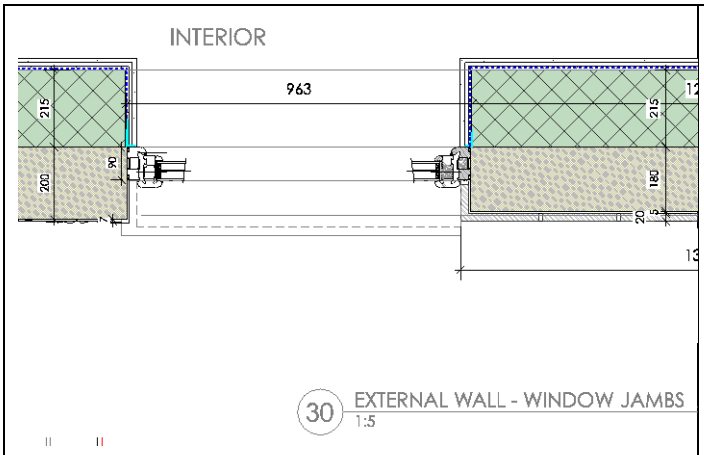
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Plasterboard	0.250					13
Isover Metac	0.034			120x44 @ 350 crs	0.130	120
Isover Metac	0.034					280

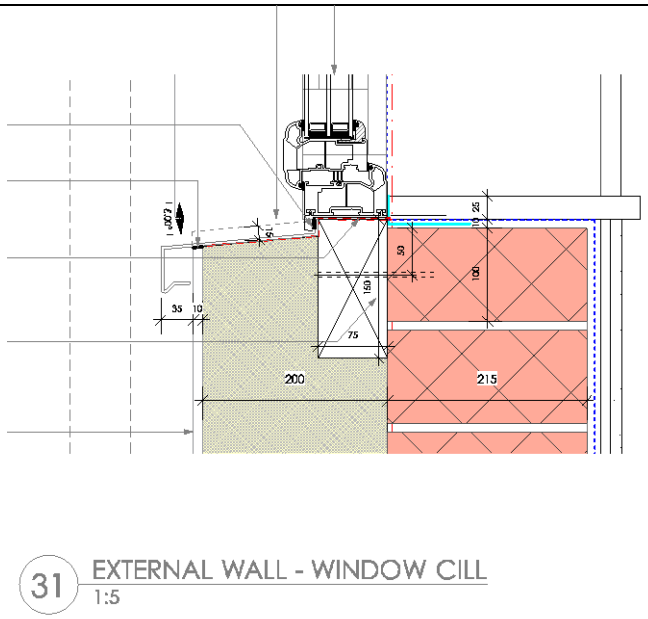
Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
87%		12.6%	41.3 cm

U-value supplement: 0.00 W/(m²K)

U-value: 0.088 W/(m²K)

8. Window Drawings





Detail Drawings for the external windows in the Building Fabric and within the insulation zone.

External window fitted with insulated EPS support bolted to walls.

CompacFoam EPS external window support.

	
Junction showing the External insulation abutting the External Window jamb	

The window are passive certified triple glazed and have PVC frames. The Ug of the glazing is 0.6.

4.3 Centre pane U-Value of glazing calculated in accordance with BS EN 673.

Glazing Unit	Centre Pane U-value (U_g)
4-20-4-20-4 Low-E 0.05 uncorrected emissivity (SGG Planitherm Total+) Internal and central panes, 90% Argon , 10% Air filled, Float Outerpane (SGG planiclear) glazing unit with SGG Swiss Spacer Ultimate spacer bar with 3mm Pu/Ps Secondary Seal	0.6 W/(m²·K)

4.4 The thermal performance of the windows (Uw) in accordance with BFRC guidelines and regulations:

Munster Passiv uPVC Frame Profile	Window U-Value
Rigid PVCu frame system with no reinforcement with 4-20-4-20-4 Low-E 0.05 uncorrected emissivity (SGG Planitherm Total+) Internal and central panes, 90% Argon , 10% Air filled, Float Outerpane (SGG planiclear) glazing unit with SGG Swiss Spacer Ultimate spacer bar with 3mm Pu/Ps Secondary Seal	0.73 W/(m²·K)

9. Airtight Envelope; Documentation of the pressure test result

The building fabric was sealed at floors using airtightness liquid applied membrane as the existing vloor and some existing walls were very uneven and hard to tape. Walls were addressed using a combination of liquid applied membrane and airtightness taping. Windows and doors used airtightness taping, walls to ceiling using airtightness taping and various service penetrations were minimised and taped where necessary. Below are a summary of photographs of the key junctions.

	
Floor wall seal with airtightness liquid applied membrane	Example of wall/ceiling junction
	
Airtightness taping around windows. Note fixings are taped.	Example of Ceiling membrane taped

Each unit had an airtightness test carried out. Preliminary tests during construction demonstrated that the new build standard of 0.6 ach were possible so it was used as the target for final airtightness test results and achieve in all cases.

Below is a schedule of the results of airtightness tests for the various apartments

Summary of Airtightness Test results

St. Bricin's Park, Block 2

Floor	Apartment	Air Changes (n50)	Permeability $m^3/(hr/m^2)q_{50}$	NSAI Airtightness Tester
		FINAL		
Ground	*39*	0.500	0.345	*Greenbuild*
Ground	*40*	0.590	0.407	*Greenbuild*
Ground	41	0.590	0.408	Greenbuild
Ground	42	0.460	0.322	Greenbuild
Ground	43	0.530	0.367	Greenbuild
First	*44*	0.590	0.405	*Greenbuild*
First	*45*	0.560	0.385	*Greenbuild*
First	*46*	0.600	0.416	*Greenbuild*
First	*47*	0.560	0.385	*Greenbuild*
First	48	0.570	0.394	Greenbuild
First	49	0.550	0.377	Greenbuild
Average		0.55	0.38	

Note : Reports available for results in bold

Pressure Test Result Summary

39 St. Bricins Park
Dublin1

2018-10-25

Result @50Pa	Flow m^3/h	Air changes (n50)	Permeability $m^3/(hr.m^2)$ (q50)
Averaged Result	**67.610**	**0.50**	**0.345**

Comparison of Air Permeability Result ($m^3/(hr.m^2)$) to 2011 Part L Regulations for new dwellings

Industry Standards	Best Practise <3	Good Practise 3-5	Acceptable 5-7	Poor >7
Your Result	0.345			

Notes:

The flow result is area independent.

The air changes rate (air leakage) and $m^3/(hr.m^2)$ (air permeability) results are both dependent on accurate measurements of the volume and envelope area of the dwelling. The measurements used here were calculated from measurements taken on site.

The Equivalent leakage area is calculated at approximately 33.80 cm^2. (@50Pa)
This is approximately the size a single hole would be through the wall, if all of the leaks now present in the dwelling were concentrated into one hole, measured at 50Pa. That is just over on twentieth of a sheet of A4 paper.

The result to be used in a DEAP BER calculation is $1/20^{th}$ of the Air Permeability value – 0.345/20 = 0.017.

The test was undertaken in accordance with the provisions of the standard I.S. EN ISO 9972:2015 (Thermal performance of buildings - Determination of air permeability of buildings - Fan pressurization method)- Method 2 (equivalent to older Method B), and all variables were within acceptable limits.

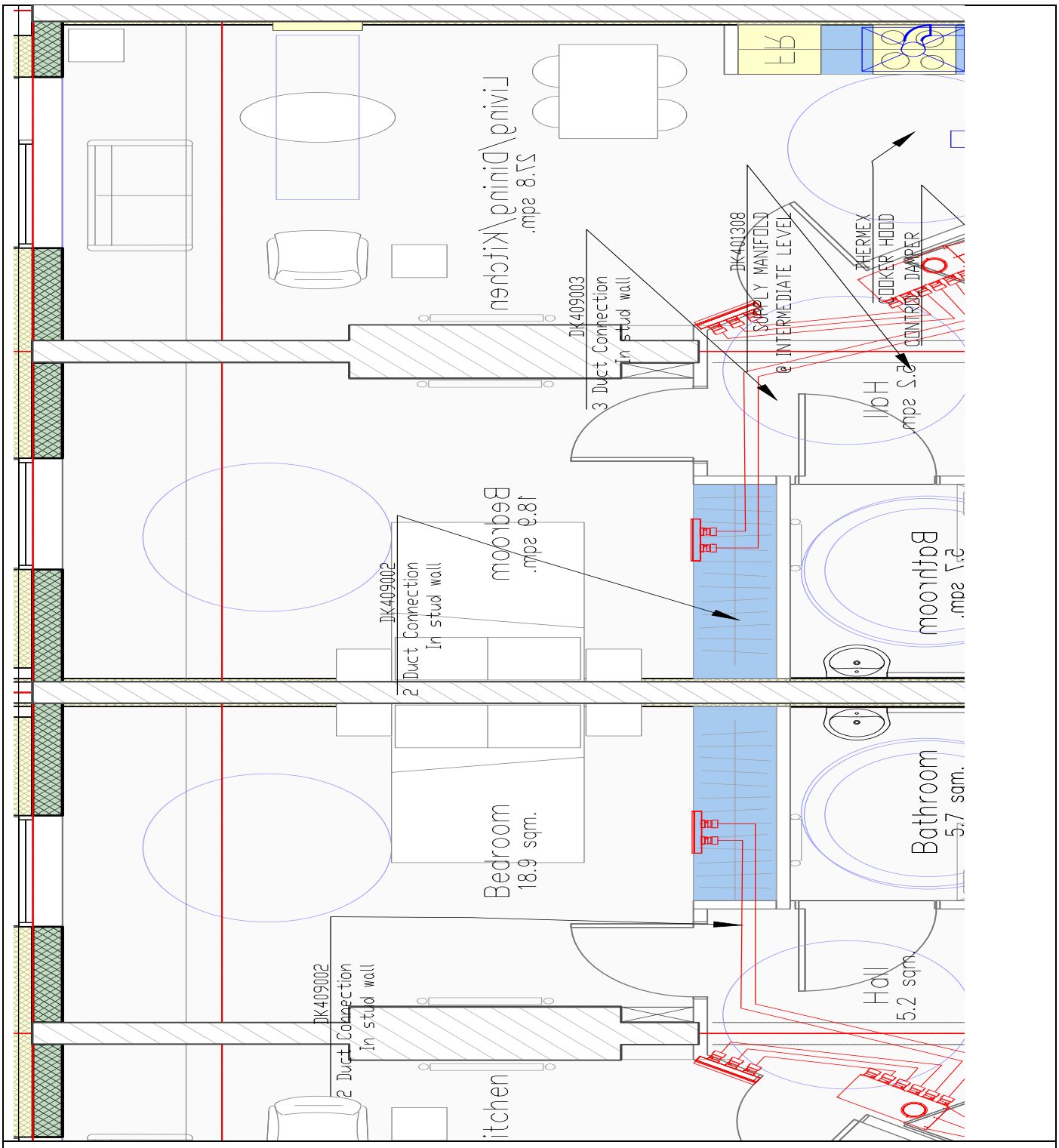
Sample Airtightness Test summary for Apartment no. 39.

10. Ventilation Ductwork

A Nilan Compac P unit was using for ventilation.

Supply air rooms were the Bedrooms and Living areas. Extract ventilation was provided to the Kitchen and Bathroom

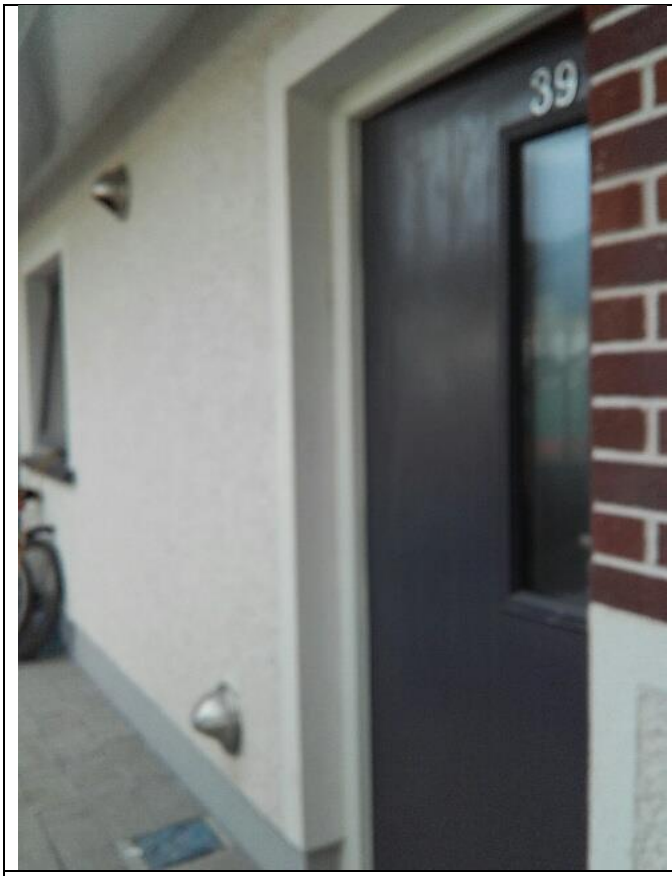
Air transfer occurs through a gap under the internal doors to the hallway transition space.



MVHR Ducting Layout

	
Supply air ducting with manifold	Extract ducting to kitchen area

Extract and Supply Air externally for Unit 39 as an example

	
Supply and extract air ducting outlets on outside wall	Insulated ducting with supports

11. Heat Supply

The Nilan Compac P unit exhaust air heat pump maximises the use of the ventilation and air supply to heat the dwelling with only cold air extracting. The dwelling required minimal heating so a towel rail in the bathroom and small electric heater were used in the living area.

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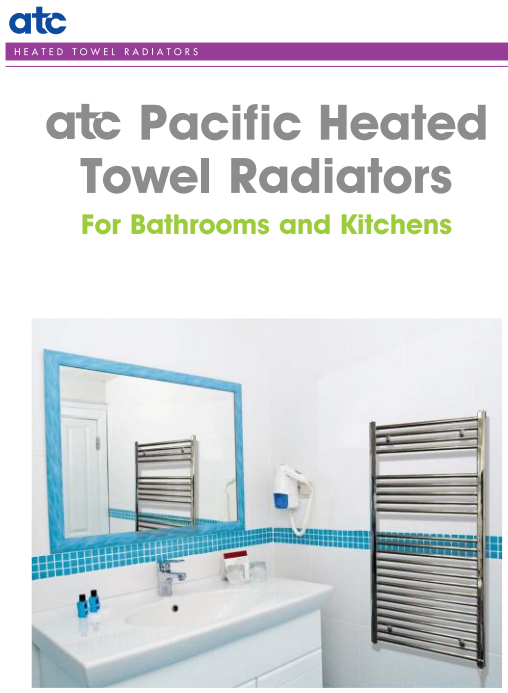
<tr>
<td> 
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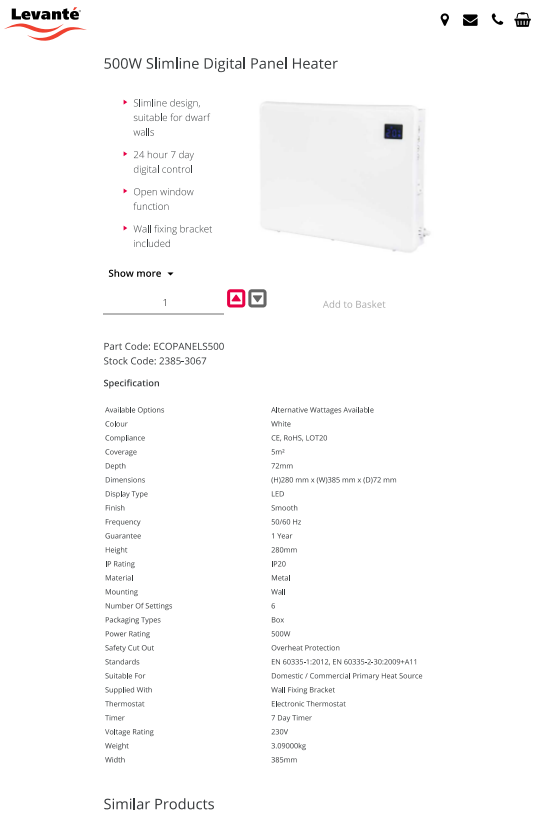
<td> 
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<tr>
<td>Towel radiator</td>
<td>Panel Heater</td>
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</table>

Hot Water is generated in the Nilan Compact P Heat Pump with an internal storage tank built into the unit. The unit has time control fort the tenants. The Dublin City council maintenance staff were brief on the controls and operation as were the tenants.

COMPACT P

Product description

Compact P is an energy-efficient total indoor climate solution for all types of low-energy buildings, single-family homes, flats and small office areas in commercial leases with a ventilation requirement of up to 300 m³/h.

Compact P recovers the energy from the extracted air using a highly efficient counter flow heat exchanger. The remaining energy that is not utilised by the counter flow heat exchanger is used by the heat pump to produce hot water, and to further heat the supply air.

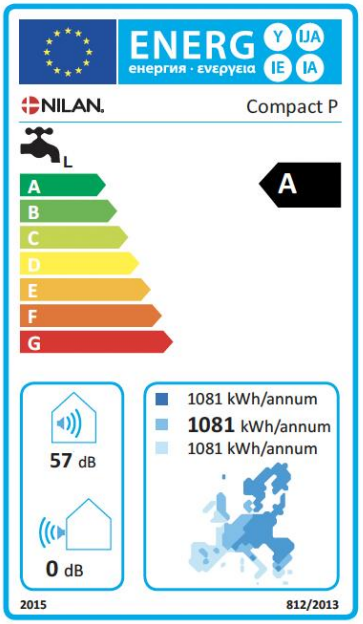
The heat pump has a reversible cooling circuit, which means that, in the summer, the unit can cool the supply air by up to 10 °C. Due to the low air exchange, the cooling does not function as an air conditioning system. On cooling, the supply air is dehumidified, which gives a more pleasant indoor climate than is possible with an ordinary ventilation unit without a heat pump.

Future-proof system

Compact P hot water production fulfils the most stringent requirements in the ecodesign regulation and thereby achieves the highest energy labelling.

The system is tested by an independent testing institute and has achieved the demanding Passive Building Certificate, as further confirmation that this is a highly energy-sustainable solution.

CERTIFIED COMPONENT
Passive House Institute



Nilan Compact P Heat Pump and ventilation unit

Time-controlled filter change alarm.
Easy filter access by opening the top front panel with the help of two finger screws.

There is plenty of space to replace filters and to vacuum clean the filter space.

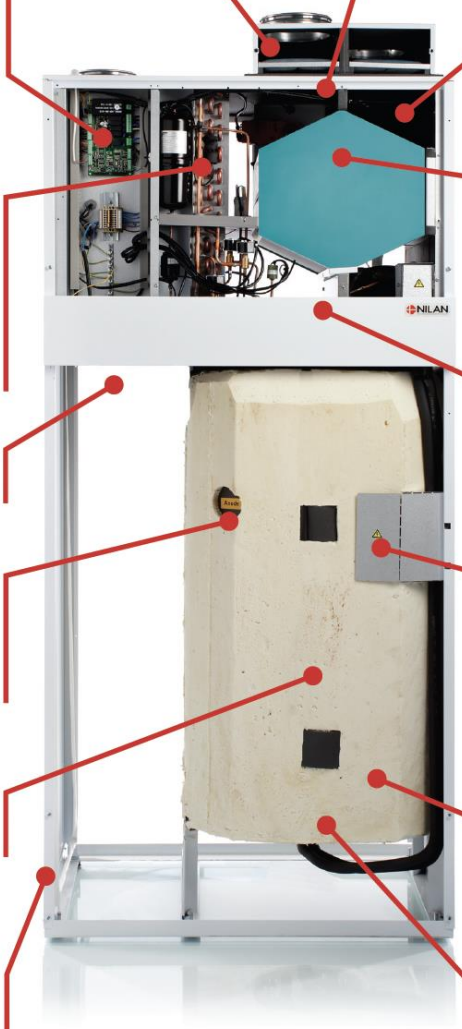
Intelligent humidity control.
Adapts ventilation to the home's current humidity level. See page 12.

CO_2-sensor can be purchased, for further demand management.

A clear, user-friendly Touch panel is included.

The modern CTS 700 control runs Modbus communication.

Low-energy EC-ventilators with B-wheel, adjustable from 20 to 100%.



Heating pump with hermetically sealed cooling circuit, for production of hot water and active heat recovery. Can raise the air intake temperature up to 34 °C.

Reversible cooling circuit that can also cool the air intake in the summer up to 10 °C, with simultaneous hot water production.

Counterflow heat exchanger in polystyrene, with a temperature efficiency ratio of up to 94%.

Automatic bypass function that carries the air past the counterflow heat exchanger when heat recovery is not required.

The LAN cable is led down, so that the control can be easily accessed without using tools.

A powder-coated condensation tray prevents the formation of "acid water", leading out the condensation water.

Compact P has an integrated water lock.

Electrically monitored sacrificial anode and corrosion protection.

On any need for replacement, an alarm is activated in the operating panel.

1.5 kW electrical completion.
For high hot water consumption where the heating pump cannot cope.

180 l hot water tank.
2 layers of glass enamelling to ensure a long lifetime.

The hot water tank is foam-insulated, giving good insulation and saving energy.

Attractive white-painted front with large front panels, giving easy access to service the system.

The cabinet has holes for pipes and tubes for water and heating installations.

Automatic anti-legionella.

Compact P is also offered in a Polar version with a built-in preheating element to frost proof the counterflow heat exchanger and heat pump.

Features of the Compact P

Certificate

Passive House Suitable Component
For cool temperate climates, valid until 31. December 2016

Passivhaus Institut
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

Category: Compact Heat Pump System
Manufacturer: Nilan A/S
8722 Hedensted, DENMARK
Product name: Compact P (92 m³/h)

This certificate was awarded based on the following criteria (limit values*):

Thermal Comfort:	$\theta_{supply\ air} \geq 16{,}5°C$
Heat Recovery of ventilation system:	$\eta_{WRG,eff} \geq 75\%$
Electric efficiency ventilation system:	$P_{el} \leq 0{,}45$ Wh/m³
Air tightness (internal/external):	$V_{Leakage} \leq 3\%$
Total Primary Energy Demand (**):	$PE_{total} \leq 55$ kWh/(m²a)
Control and calibration (*)	
Air pollution filters (*)	
Anti freezing strategy (*)	
Noise emission and reduction (*)	

Measured values to be used in PHPP **(set point 92 m³/h)**
useful air flow rates 52 to 120 m³/h

Heating

		Test point 1	Test point 3	Test point 3	Test point 4	
Outside Air Temperature	T_{amb}	-7.0	2.1	7.1		°C
Thermal Output Heating Heat Pump	$P_{WP,Heiz}$	0.49	0.62	0.67		kW
COP number Heating Heat Pump	COP_{Heiz}	2.43	2.55	2.78		-
Maximum available supply air temperature with Heat Pump only(*)		33.6				°C

Hot water

		Test point 1	Test point 3	Test point 3	Test point 4	
Outside Air Temperature	T_{amb}	-6.9	1.9	7.2	20.2	°C
Thermal Output Heat Pump for heating up storage tank.	$P_{DHW\ heating\ up}$	0.51	0.72	0.89	1.02	kW
Thermal Output Heat Pump for reheating storage tank	$P_{DHW\ reheating}$	0.54	0.71	0.83	0.94	kW
COP Heat Pump for heating up storage tank	$COP_{DHW,\ heating\ up}$	2.11	2.60	3.08	3.38	-
COP Heat Pump for reheating storage tank	$COP_{DHW\ reheating}$	1.94	2.50	2.80	3.05	-
Averge storage tank temperature		50.5				°C
Specific storage heat losses		1.63				W/K
Exhaust air addition (if applicable)						m³/h

(*) detailed description of criteria and key values see attachment.
(**) for heating, domestic hot water (DHW), ventilation, auxiliary electricity in the reference building, explanation see attachment.

Heat Recovery
$\eta_{WRG,eff}$ = 77%

Electric efficiency
0.43 Wh/m³

Air tightness
$V_{leak,\ internal}$ = 1.0%
$V_{leak,\ external}$ = 1.1%

Frost protection
down to -7 °C

Total Primary Energy Demand (**)
54.1 kWh/(m²**a**)

CERTIFIED COMPONENT
Passive House Institute

www.passivehouse.com

0390ch03

PH Certificate for the Compact P Heat Pump System

12. PHPP

EnerPHit Verification

Building:	Block 2		
Street:	St. Bricin's Park, Block 2, Arbour Hill		
Postcode/City:		Dublin 7	
Province/Country:	Dublin	IE-Ireland	
Building type:	Residential		
Climate data set:	IE0001a-Dublin		
Climate zone:	3: Cool-temperate	Altitude of location:	15.84 m
Home owner / Client:	Dublin City Council		
Street:	Civic Offices, Wood Quay		
Postcode/City:		Dublin 8	
Province/Country:	Dublin	IE-Ireland	

Architecture:	Low Energy Design		
Street:	38 Bramley Walk		
Postcode/City:	D15 W2WY	Castleknock	
Province/Country:	Dublin	IE-Ireland	
Mechanical system:	Morley Walsh Consulting Engineers		
Street:	41 Lower Dominick Street		
Postcode/City:		Dublin 1	
Province/Country:	Dublin	IE-Ireland	
Energy consultancy:	Low Energy Design		
Street:	38 Bramley Walk		
Postcode/City:	D15 W2WY	Castleknock	
Province/Country:	Dublin	IE-Ireland	
Certification:	MosArt Ltd.		
Street:	Wicklow County Campus		
Postcode/City:	A67 X566	Rathnew	
	Wicklow	IE-Ireland	

Year of construction:	2018	Interior temperature winter [°C]:	20.0	Interior temp. summer [°C]:	25.0
No. of dwelling units:	11	Internal heat gains (IHG) heating case [W/m²]:	3.0	IHG cooling case [W/m²]:	
No. of occupants:	17.2	Specific capacity [Wh/K per m² TFA]:	132	Mechanical cooling:	

Specific building characteristics with reference to the treated floor area

					Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	612.5				
Space heating	Heating demand	kWh/(m²a)	21	≤	25	-	yes
	Heating load	W/m²	11	≤	-	-	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	-	≤	-	-	
	Cooling load	W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C)	%	0	≤	10		yes
	Frequency excessively high humidity (> 12 g/kg)	%	0	≤	20		yes
Airtightness	Pressurization test result n_{50}	1/h	0.6	≤	1.0		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	127	≤	127.4085501		yes
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	58	≤	-	-	-
	Generation of renewable energy (in relation to projected building	kWh/(m²a)	0	≥	-	-	

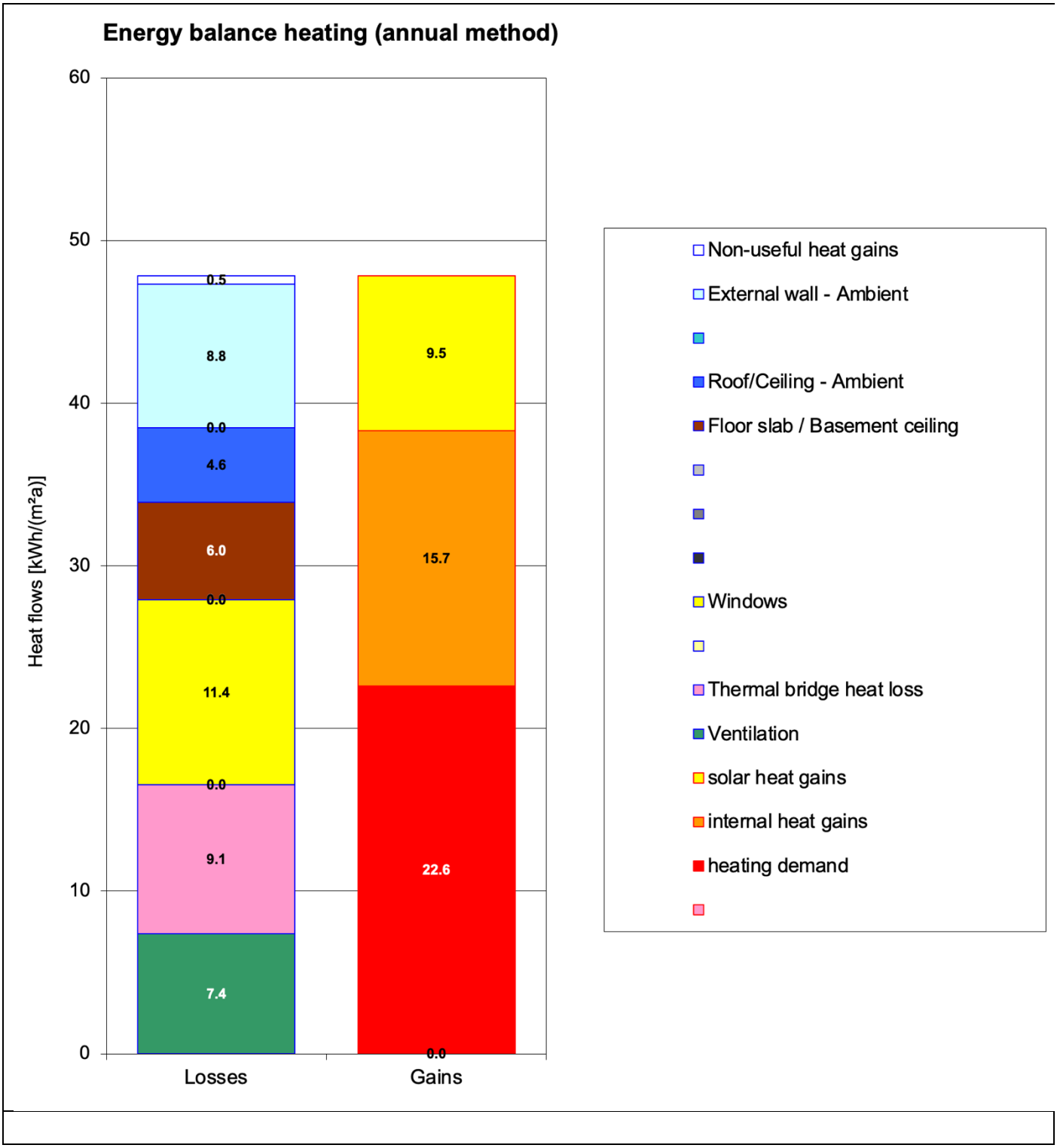
[2] Empty field: Data missing; '-': No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

EnerPHit Classic? yes

Task:	First name:	Surname:	Signature:
2-Certifier	Tomás	O'Leary	

Certificate ID	Issued on:	City:
20893-20903_MosArt_PH_20190430_TOL	30/04/19	Rathnew



13. Construction Costs

The project was constructed during the 2018-2019 period. The construction costs for the EnerPHit element oft he project were €1.21M.

The approximate costs were €1975 m2 for the building including VAT at 13.5% or €1,740 excluding VAT which was considered good value for money at the time. This meant the units were between €106-113,000 each for a world class deep retrofit to EnerPHit standards and achieving an A3 Building Energy Rating under the Irish assessment methodology. A new build one bedroom apartment was costing between €250-300,000 at the tim