# Project Documentation
# Gebäude-Dokumentation

## Abstract | Zusammenfassung

## Two Storey Detached single family house

### Data of building | Gebäudedaten

| | | | |
|---|---|---|---|
| Year of construction<br>Baujahr | 2018 | **Space heating**<br>**Heizwärmebedarf** | **15**<br>**kWh/(m²a)** |
| U-value external wall<br>U-Wert Außenwand | 0,124<br>W/(m²K) | | |
| U-value basement<br>U-Wert Kellerdecke | 0,086<br>W/(m²K) | Primary Energy Renewable (PER)<br>Erneuerbare Primärenergie (PER) | --<br>kWh/(m²a) |
| U-value roof<br>U-Wert Dach | 0,108<br>W/(m²K) | Generation of renewable Energy<br>Erzeugung erneuerb. Energie | --<br>kWh/(m²a) |
| U-value window<br>U-Wert Fenster | 0,78<br>W/(m²K) | Non-renewable Primary Energy (PE)<br>Nicht erneuerbare Primärenergie (PE) | 81<br>kWh/(m²a) |
| Heat recovery<br>Wärmerückgewinnung | 81 % | Pressurization test $n_{50}$<br>Drucktest $n_{50}$ | 0,5 $h^{-1}$ |
| Special features<br>Besonderheiten | | | |

## Brief Description

# Passive House Craigavon – ID 5830

This modest house came about as a result of our client wanting a certified Passive house to that particular standard and also within a fixed budget. The house was designed as a simple form, two storey for envelope energy efficiency and with large amounts of glazing to the southwest side of the house. These spaces are also the main living spaces and fortunately offer the best view from the site.

The house has all of the necessary attributes of a passive house. These features include triple glazing, super insulated, heat recovery and ventilation and very low airtightness. The house will not have a conventional central heating system as it is anticipated that the peak space heating demand will be in the order of 3kw for the entire house. The house would therefore be comfortably heated, during very colder weather, with two small 5kw wood burning stove located in the open plan living space. The reason why a conventional heating system is not necessary is that the ventilation system will transfer a calculated amount of heat throughout the house with smaller rooms needing no additional heat source due to the delivered temperature of the warm air.

The house has been analysed by imputing relevant data into the Passive House PHPP software. This software essentially measures the energy efficiency of the envelope and allows for 'passive' heat gains such as south facing glazing, heat recovered from the ventilation system and the heat given off by the day-to-day usage of the house. This software and its application is performance based with the combined envelope efficiency and passive heating elements of the design combining to create a building that has a heat loss of only 15kw/m2/a.

In this instance the client has opted to have the house fully certified by the German Passive House institute. This costs a little extra in terms of professional fees but means that the house will have a quality approved certificate issued by the Passive House Institute in Germany. It is suggested that this seal of approval in terms of the energy efficiently of the house should positively affect the resale value of the house making the extra capital cost of the project an investment in the future. The house will also have considerably lower the Co2 emissions than conventional houses. Energy efficiency is therefore a large factor in building sustainably.

## Responsible project participants
## Verantwortliche Projektbeteiligte

| | |
|---|---|
| Architect<br>Entwurfsverfasser | Paul McAlister Architects Ltd |
| Implementation planning<br>Ausführungsplanung | Paul McAlister Architects Ltd |
| Building systems<br>Haustechnik | Paul McAlister Architects Ltd |
| Structural engineering<br>Baustatik | George Dawson Ltd |
| Building physics<br>Bauphysik | Paul McAlister Architects Ltd |
| Passive House project planning<br>Passivhaus-Projektierung | Paul McAlister Architects Ltd |
| Construction management<br>Bauleitung | Paul McAlister Architects Ltd |

## Certifying body
## Zertifizierungsstelle

Earth Cycle Technologies (ECT) & Passivhaus Institut Darmstadt

## Certification ID
## Zertifizierungs ID

| | |
|---|---|
| **5830** | Project-ID (www.passivehouse-database.org)<br>Projekt-ID (www.passivhausprojekte.de) |

## Author of project documentation
## Verfasser der Gebäude-Dokumentation

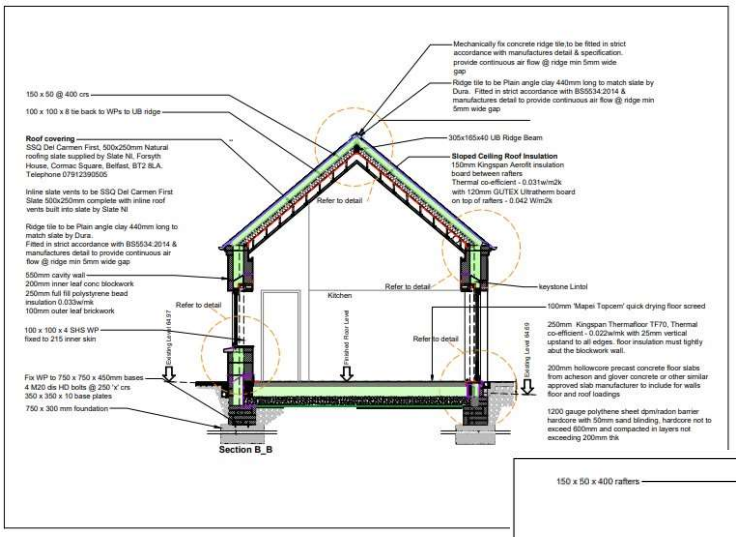
Paul McAlister

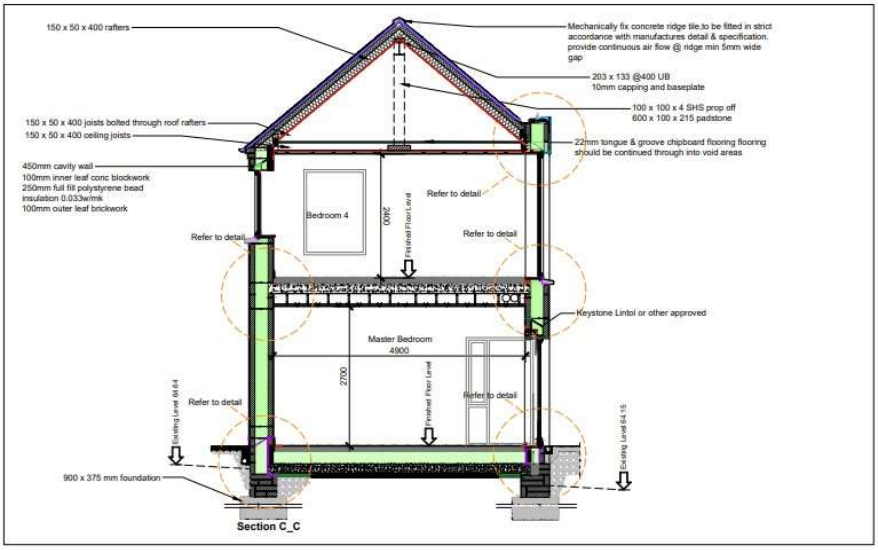
| Date<br>Datum | Signature<br>Unterschrift |
|---|---|
| 11-05-2022 |  |

## 1. Ansichtsfotos - Photos

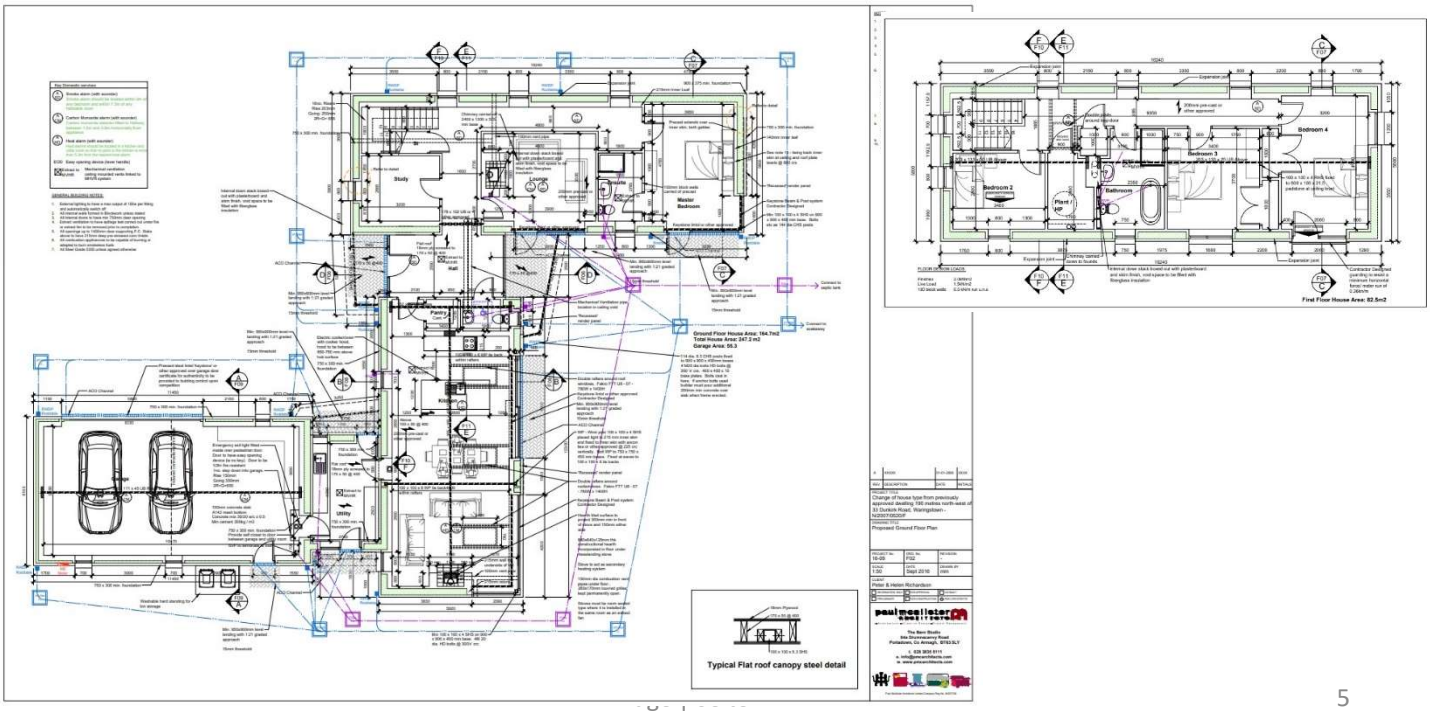
## 2. Innenfoto exemplarisch - Interior

# 3. Schnittzeichnung / Section

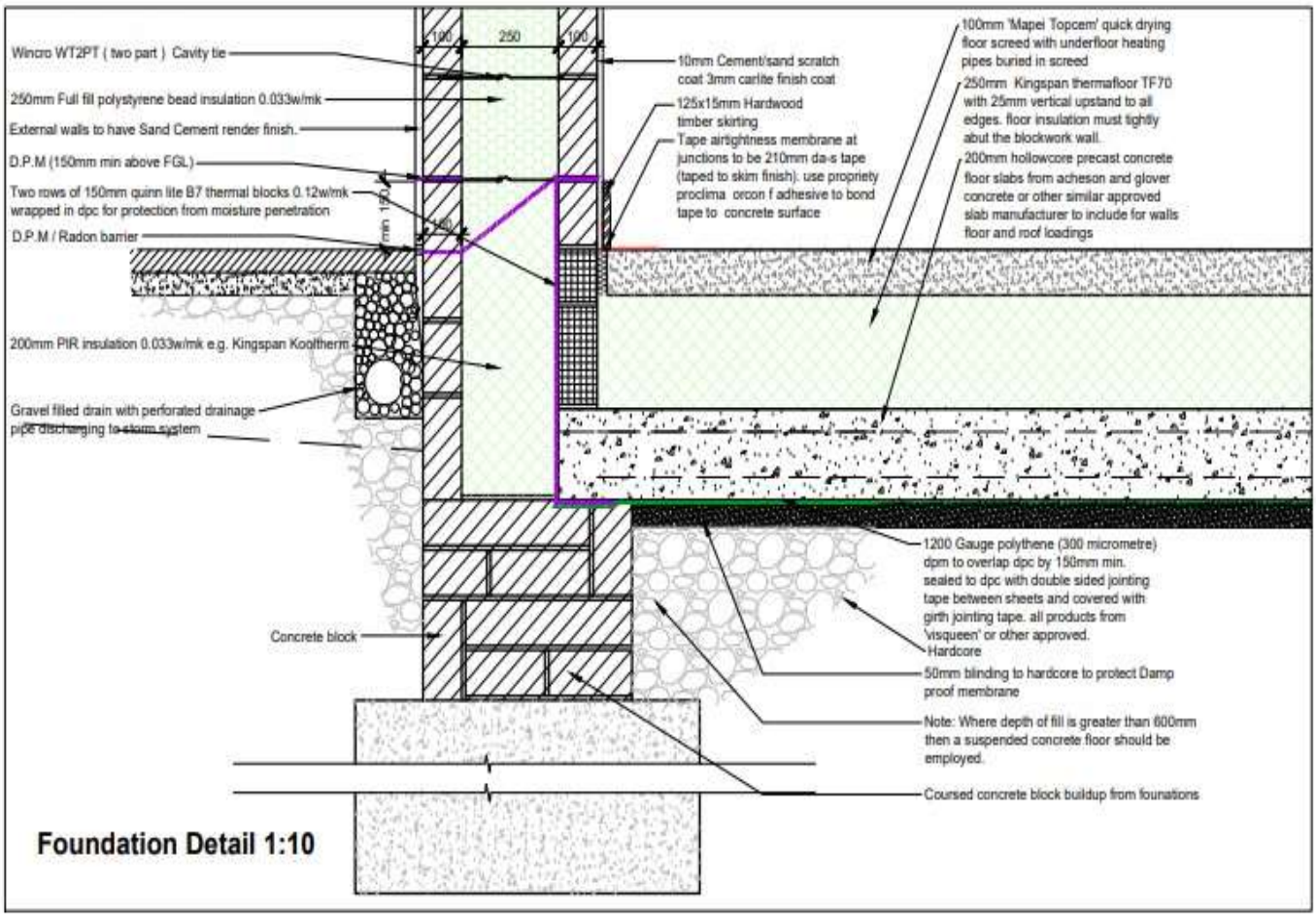



# 4. Grundrisse / Floor Plans



## 5. Konstruktion der Bodenplatte – Floor Slab




In order to keep the construction-related thermal bridge low, the base of wall is finished aerated concrete block.

| Assembly no. | | | | | | Interior insulation? |
|---|---|---|---|---|---|---|
| 03ud | Floor | | | | | |

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 |

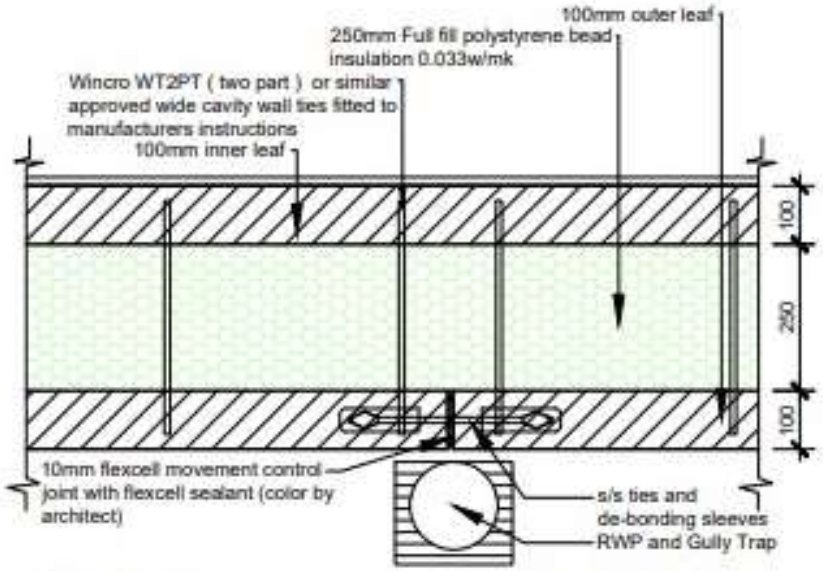
| Area section 1 | λ [W/(mK)] | Area section 2 (optional) | λ [W/(mK)] | Area section 3 (optional) | λ [W/(mK)] | Thickness [mm] |
|---|---|---|---|---|---|---|
| Screed | 1.600 | | | | | 75 |
| Kingspan TF70 | 0.022 | | | | | 250 |
| Concrete Subfloor | 2.100 | | | | | 225 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Percentage of sec. 1 | Percentage of sec. 2 | Percentage of sec. 3 | Total |
|---|---|---|---|
| 100% | | | 55.0 cm |

U-value supplement W/(m²K)

**U-value: 0.086** W/(m²K)

# 6. Konstruktion der Außenwände – Outer Walls




A Cavity wall construction – 100mm blockwork with 250mm cavity (full fill insulation) with 100mm inner leaf.

| Assembly no. | | | | | | Interior insulation? |
|---|---|---|---|---|---|---|
| 02ud | Wall | | | | | |

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 |

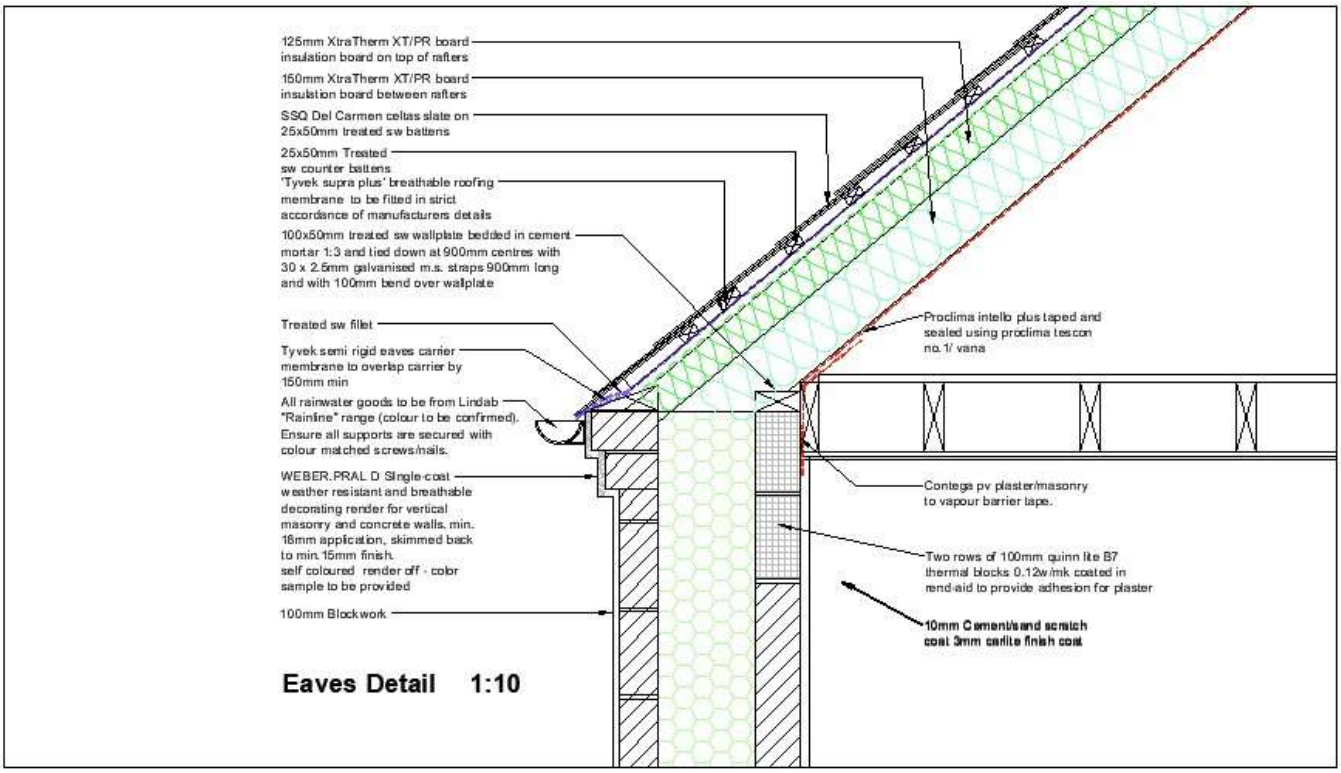
| Area section 1 | λ [W/(mK)] | Area section 2 (optional) | λ [W/(mK)] | Area section 3 (optional) | λ [W/(mK)] | Thickness [mm] |
|---|---|---|---|---|---|---|
| Internal Plaster | 0.600 | | | | | 18 |
| Block | 1.230 | | | | | 215 |
| Bead | 0.033 | | | | | 250 |
| Block | 1.230 | | | | | 100 |
| Render | 0.800 | | | | | 18 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Percentage of sec. 1 | Percentage of sec. 2 | Percentage of sec. 3 | Total |
|---|---|---|---|
| 100% | | | 60.1 cm |

U-value supplement [ ] W/(m²K)

**U-value: 0.124** W/(m²K)

# 7. Konstruktion des Daches / Roof




Roof is a tradtional timber cut roof.
Insulation is 125mm PIR insulation on top with 150mm PIR Insulation between rafters.

Unheated / uncooled attic -> (on the right)

| Assembly no. | Building assembly description | | | | | Interior insulation? |
|---|---|---|---|---|---|---|
| 01ud | Roof Else Where | | | | | |

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 |

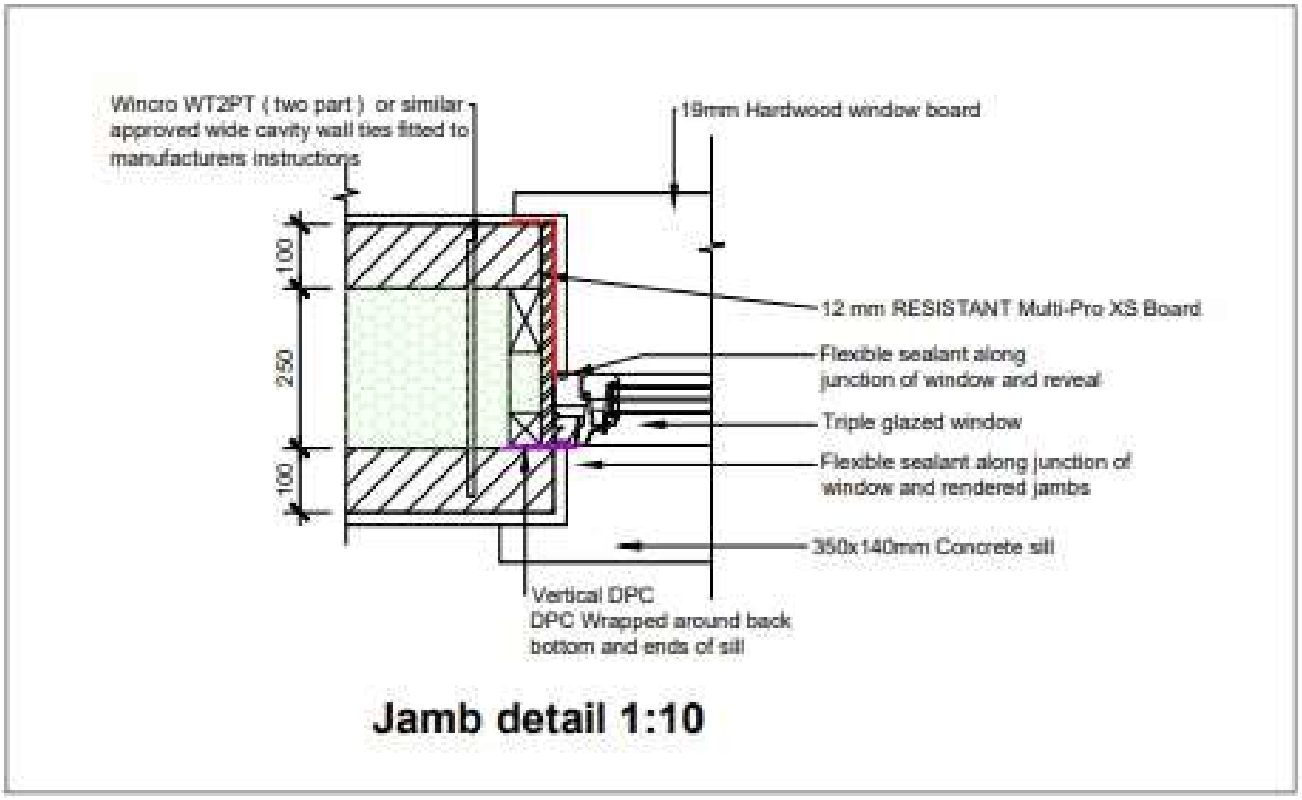
| Area section 1 | λ [W/(mK)] | Area section 2 (optional) | λ [W/(mK)] | Area section 3 (optional) | λ [W/(mK)] | Thickness [mm] |
|---|---|---|---|---|---|---|
| Kingspan TP 10 | 0.022 | | | | | 125 |
| Kingspan TP 10 | 0.022 | | 0.130 | | | 150 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Percentage of sec. 1 | Percentage of sec. 2 | Percentage of sec. 3 | Total |
|---|---|---|---|
| 93% | 7.3% | | 27.5 cm |

U-value supplement [ ] W/(m²K)

U-value: 0.087 W/(m²K)

## 8. Fenster und Fenster-Einbau – Window Installation




| | |
|---|---|
| **Beschreibung der Fenster (rahmen)-Konstruktion, Hersteller** | **Munster Joinery / Baskil Windows** |
| **Fabrikat Fenster (rahmen; Produktname)** | PassiV Future Proof<br>Component-ID: 0064wi03 |
| **Rahmen-U-Wert Uf** | 0,78 W/(m²K) |
| **Bauart der Verglasung** | Outside opening plastic window frame, chambers partly filled with PU-foam (0.030 W/(mK)); Glazing: 4/20/4/20/4 |
| **Glas-U-Wert Ug** | 0,70 W/(m²K) |
| **g-Wert der Verglasung** | 0,70 |

# 9. Beschreibung der luftdichten Hülle – Air Tight Envelope

The first pressure test was carried out after the completion of the airtight shell.

**Summary**

| retrotec FanTestic | version: **5.10.68** | licensed to: **ATS Surveys** |
|---|---|---|
| Test date: **2018-11-28** | By: **Leo Carr** | |
| Customer: | **Peter & Helen Richardson** | |
| Building Lot Number: | | |
| Building address: | **29**<br>**Dunkirk Rd**<br>**Waringstown, Co Down**<br>**N Ireland** | |

| **Building and Test Information** | |
|---|---|
| Test file name: | **29 Dunkirk Rd Pressurize** |
| Building volume [$m^3$]: | **708** |
| Envelope Area [$m^2$]: | **717** |
| Floor Area [$m^2$]: | **155** |
| Building Height (from ground to top) [m]: | **5.5** |

| **Results** | |
|---|---|
| Air flow at 50 Pa, $Q_{50}$ [$m^3/h$] | **309.80** |
| Air changes, $n_{50}$ | **0.44** |
| Equivalent leakage area at 50 Pa [$cm^2$] | **79.90** |
| Permeability at 50 Pa [$m^3/h/m^2$] | **0.432** |

**Summary**

| retrotec FanTestic | version:**5.10.68** | licensed to: **ATS Surveys** |
|---|---|---|
| Test date: **2018-11-28** | By: **Leo Carr** | |
| Customer: | **Peter & Helen Richardson** | |
| Building Lot Number: | | |
| Building address: | **29**<br>**Dunkirk Rd**<br>**Waringstown, Co Down**<br>**N Ireland** | |

| **Building and Test Information** | |
|---|---|
| Test file name: | **29 Dunkirk Rd Depressurize** |
| Building volume [$m^3$]: | **708** |
| Envelope Area [$m^2$]: | **717** |
| Floor Area [$m^2$]: | **155** |
| Building Height (from ground to top) [m]: | **5.5** |

| **Results** | |
|---|---|
| Air flow at 50 Pa, $Q_{50}$ [$m^3/h$] | **364.00** |
| Air changes, $n_{50}$ | **0.51** |
| Equivalent leakage area at 50 Pa [$cm^2$] | **32.95** |
| Permeability at 50 Pa [$m^3/h/m^2$] | **0.508** |

**Air tightness concept**
Walls: interior plaster
Floor plate: concrete
Connection window: with plaster end rail + adhesion preventer + acrylic joint
Roof: sheet of foil Plaster-foil connection: plastered expanded metal

## 10. Lüftungsgerät / Ventilation Unit

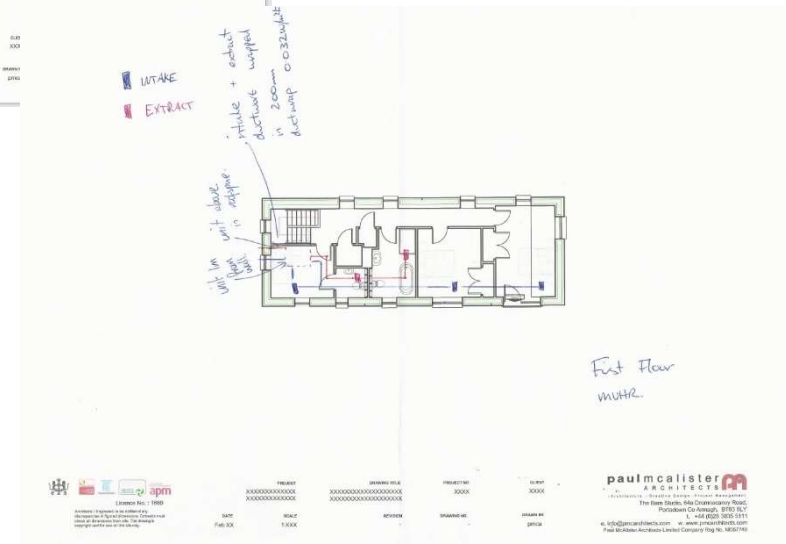
The ventilation unit is fitted with highly efficient counter-flow heat exchangers which are optimised to a very high efficiency level thus achieving a very low specific fan power (SPI value) for the entire unit.

| | |
|---|---|
| **Fabrikat Lüftungsanlage** | **Dantherm** |
| **effektiver Wärmebereitstellungsgrad** | 81.6 % |
| **Elektroeffizienz** | 0,26 Wh/m³ |

## 11. Lüftungsplanung Kanalnetz / Duct Layouts


Blue: Supply air ducts
Red: Extract air ducts

From here, the used air is brought back to the heat exchanger via an exhaust air duct network located in the attic



## 12. Wärmeversorgung / Heat Supply

Hot Water
The ESP Ecocent units are industry leading, innovative hot water supply systems which use a built-in Air Source Heat Pump to scavenge waste heat from the MVHR and make domestic hot water heating highly efficient offering a saving of up 75%. This system hold 300l of hot water.


Room Heating
The house is fitted with two wood burning stoves and a number of small electric radiators located in the bathrooms and ensuites.

## 13. Baukosten – Building Costs

The pure construction costs amounted to 1384 £/m²

## 14. Literatur

# 15. PHPP-Ergebnisse – PHPP Results

## Passive House Verification

| | | | |
|---|---|---|---|
| **Building:** | 29 Dunkirk Road | | |
| Street: | 29 Dunkirk Road, | | |
| Postcode/City: | BT66 7SW | Waringstown, | |
| Province/Country: | Armagh NI | GB-United Kingdom/ Britain | |
| Building type: | Single Family Residence | | |
| Climate data set: | GB0022a-Belfast-Aldergrove | | |
| Climate zone: | 3: Cool-temperate | Altitude of location: | 50 m |
| **Home owner / Client:** | Peter and Helen Richardson | | |
| Street: | 29 Dunkirk Road, | | |
| Postcode/City: | BT66 7SW | Waringstown, | |
| Province/Country: | Armagh NI | GB-United Kingdom/ Britain | |

| | | | |
|---|---|---|---|
| **Architecture:** | Paul McAlister Architects Ltd | | |
| Street: | The Barn Studio, 64A Drumnacanvy Road | | |
| Postcode/City: | BT63 5LY | Portadown | |
| Province/Country: | Co Armagh, | GB-United Kingdom/ Britain | |
| **Energy consultancy:** | Paul McAlister Architects Ltd | | |
| Street: | The Barn Studio, 64A Drumnacanvy Road | | |
| Postcode/City: | BT63 5LY | Portadown | |
| Province/Country: | Co Armagh, | GB-United Kingdom/ Britain | |

| | | | |
|---|---|---|---|
| **Mechanical engineer:** | Paul McAlister Architects Ltd | | |
| Street: | The Barn Studio, 64A Drumnacanvy Road | | |
| Postcode/City: | BT63 5LY | Portadown | |
| Province/Country: | Co Armagh, | GB-United Kingdom/ Britain | |
| **Certification:** | Earth Cycle Technologies | | |
| Street: | 10 Springfield | | |
| Postcode/City: | A67F863 | | |
| Province/Country: | Ireland | | |

| | | | | | |
|---|---|---|---|---|---|
| Year of construction: | 2019 | Interior temperature winter [°C]: | 20.0 | Interior temp. summer [°C]: | 25.0 |
| No. of dwelling units: | 1 | Internal heat gains (IHG) heating case [W/m²]: | 2.3 | IHG cooling case [W/m²]: | 2.3 |
| No. of occupants: | 3.1 | Specific capacity [Wh/K per m² TFA]: | 204 | Mechanical cooling: | |

**Specific building characteristics with reference to the treated floor area** — The PHPP has not been filled completely; it is not valid as verification

| | | | | Criteria | Alternative criteria | Fullfilled?[2] |
|---|---|---|---|---|---|---|
| | Treated floor area m² | 203.6 | | | | |
| **Space heating** | Heating demand kWh/(m²a) | 15 | ≤ | 15 | - | yes |
| | Heating load W/m² | 13 | ≤ | - | 10 | |
| **Space cooling** | Cooling & dehum. demand kWh/(m²a) | - | ≤ | - | - | - |
| | Cooling load W/m² | - | ≤ | - | - | |
| | Frequency of overheating (> 25 °C) % | 0 | ≤ | 10 | | yes |
| | Frequency of excessively high humidity (> 12 g/kg) % | 0 | ≤ | 20 | | yes |
| **Airtightness** | Pressurization test result $n_{50}$ 1/h | 0.5 | ≤ | 0.6 | | yes |
| **Non-renewable Primary Energy (PE)** | PE demand kWh/(m²a) | 81 | ≤ | 135 | | yes |
| **Primary Energy Renewable (PER)** | PER demand kWh/(m²a) | 95 | ≤ | - | - | - |
| | Generation of renewable energy (in relation to projected building footprint area) kWh/(m²a) | - | ≥ | - | - | |

[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.

**Passive House Classic?** yes

| Task: | First name: | Surname: | Signature: |
|---|---|---|---|
| 2-Certifier | Robert | Ryan | |

| Certificate ID | Issued on: | City: |
|---|---|---|
| Pending ID | | Wicklow IE |

Project data imported from designPH 1.6.02 — PHPP9 display.code: 290004860_070316_PHAIE_ip09