

Project Documentation Gebäude-Dokumentation



Abstract | Zusammenfassung



Milton Road Passivhaus

Data of building | Gebäudedaten

| | | | |
|---|--|---|--|
| Year of construction Baujahr | 2022 | Space heating Heizwärmebedarf | 14.0 kWh/(m²a) |
| U-value external wall U-Wert Außenwand | 0.202 W/(m ² K) | | |
| U-value basement U-Wert Kellerdecke | 0.241 W/(m ² K) | Primary Energy Renewable (PER) Erneuerbare Primärenergie (PER) | 68 kWh/(m ² a) |
| U-value roof U-Wert Dach | 0.165 W/(m ² K) | Generation of renewable Energy Erzeugung erneuerb. Energie | 38 kWh/(m ² a) |
| U-value window U-Wert Fenster | 1.40 W/(m ² K) | Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE) | 107 kWh/(m ² a) |
| Heat recovery Wärmerückgewinnung | 82 % | Pressurization test n Drucktest n ₅₀ | 0.4 h ⁻¹ |
| Special features Besonderheiten | <p>The heat recovery ventilation system was combined with an in-line dehumidifier for additional occupant comfort.</p> <p>Für zusätzlichen Komfort für die Bewohner wurde das Lüftungssystem mit Wärmerückgewinnung mit einem integrierten Luftentfeuchter kombiniert.</p> | | |

Brief Description

Milton Road Passivhaus

The Milton Road Passivhaus is located in the leafy suburb of Mount Eden, a little under 5km south of Auckland's central business district. The clients, from central and eastern Europe, had far higher expectations of thermal comfort than typical New Zealand construction affords, and engaged Context Architects to design their Passive House forever home.

The result is a two-storey, four-bedroom family home carefully designed to meet their long-term needs and comprising an open plan kitchen and dining room, living room and studio/playroom/granny flat. The home was constructed with Formance SIPS EPS-core wall and roof panels sitting on a fully insulated concrete raft slab, with a total 214m² Treated Floor Area.

An important consideration for the client was to effectively manage their internal relative humidity levels in Auckland's challengingly humid winter climate. An in-line dehumidifier was designed, integrated in to the MVHR supply air, and is used for a few weeks each year to maintain an ideal level.

Kurzbeschreibung

Das Milton Road Passivhaus befindet sich im grünen Vorort Mount Eden, knapp 5 km südlich des zentralen Geschäftsviertels von Auckland. Die Kunden aus Mittel- und Osteuropa hatten weitaus höhere Erwartungen an den thermischen Komfort als sie in typischen neuseeländischen Gebäuden erwarten können und beauftragten Context Architects mit der Gestaltung ihres Passivhauses für die Ewigkeit.

Das Ergebnis ist ein zweistöckiges Einfamilienhaus mit vier Schlafzimmern, das sorgfältig auf die langfristigen Bedürfnisse der Bewohner ausgelegt ist und aus einer offenen Küche und einem Esszimmer, einem Wohnzimmer und einem Studio/Spielzimmer/Einliegerwohnung besteht. Das Haus wurde mit Formance SIPS EPS-Kernwand- und Dachpaneelen auf einer vollisolierten Betonplatte gebaut und verfügt über eine behandelte Gesamtbodenfläche von 214 m².

Eine wichtige Überlegung für den Kunden war die effektive Regulierung der relativen Luftfeuchtigkeit im Inneren des Gebäudes im herausfordernd feuchten Winterklima von Auckland. Ein Inline-Luftentfeuchter wurde entwickelt, in die MVHR-Zuluft integriert und wird jedes Jahr einige Wochen lang verwendet, um ein ideales Niveau aufrechtzuerhalten.

Responsible project participants Verantwortliche Projektbeteiligte

| | |
|--|---|
| Architect Entwurfsverfasser | Context Architects www.context.nz |
| Implementation planning Ausführungsplanung | Context Architects www.context.nz |
| Building systems Haustechnik | Edge Innovation www.edgeinnovation.co.nz |
| Structural engineering Baustatik | Chester Consultants www.chester.co.nz |
| Building physics Bauphysik | Context Architects www.context.nz |
| Passive House project planning Passivhaus-Projektierung | Context Architects www.context.nz |
| Construction management Bauleitung | Helicon Construction www.helicon.co.nz |

Certifying body Zertifizierungsstelle

Sustainable Engineering Ltd
www.sustainableengineering.co.nz

Certification ID Zertifizierungs ID

ID-7148

Project-ID (www.passivehouse-database.org)
Projekt-ID (www.passivhausprojekte.de)

Author of project documentation Verfasser der Gebäude-Dokumentation

Ben Frost
www.context.nz

Date
Datum

Signature
Unterschrift

23rd September 2024



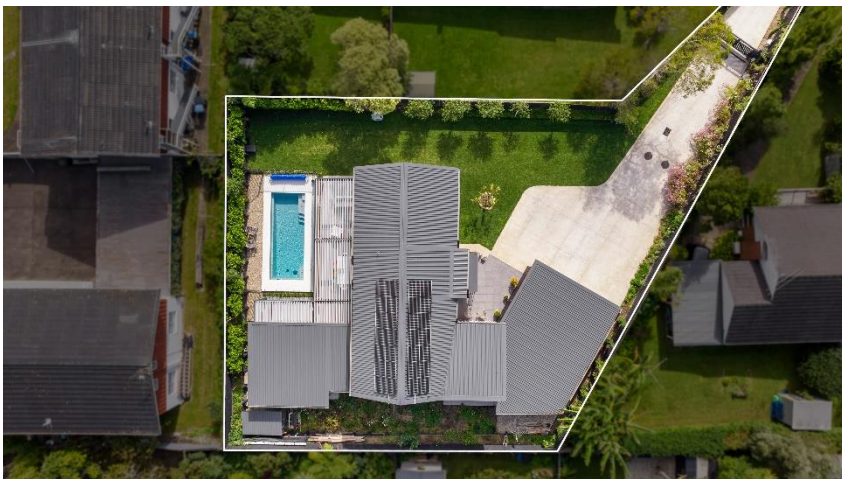
1. Exterior photos - Ansichtsfotos



North & East Elevations



North & West Elevations



From Above (North is up the page)

2. Interior photos - Innenfoto exemplarisch

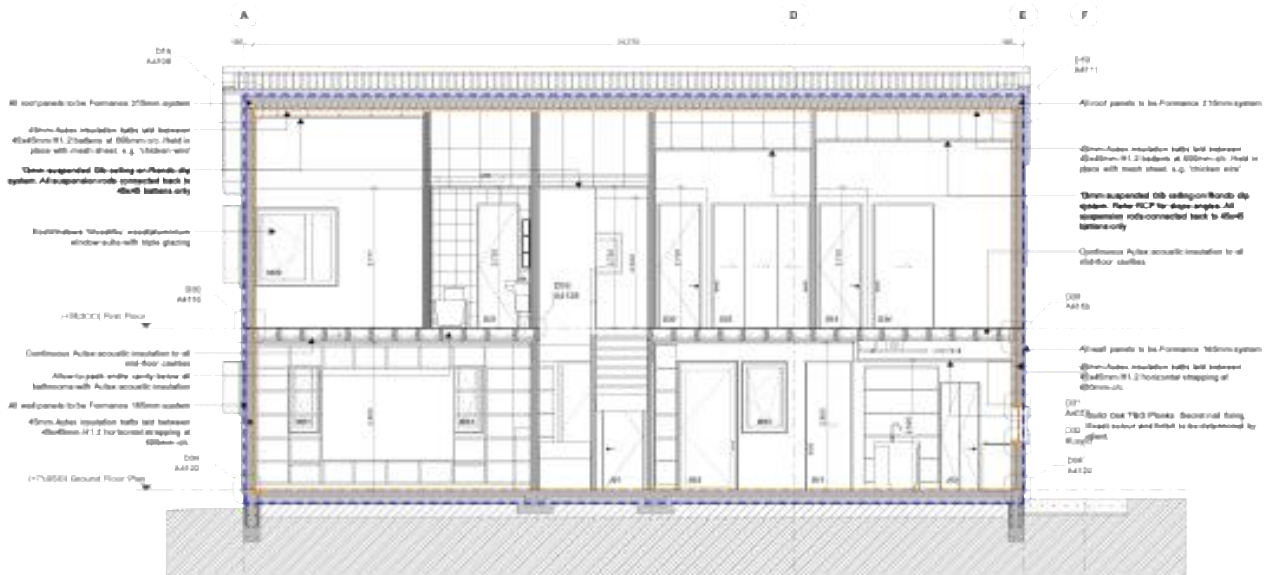


Kitchen



Lounge

3. Sections - Schnittzeichnung

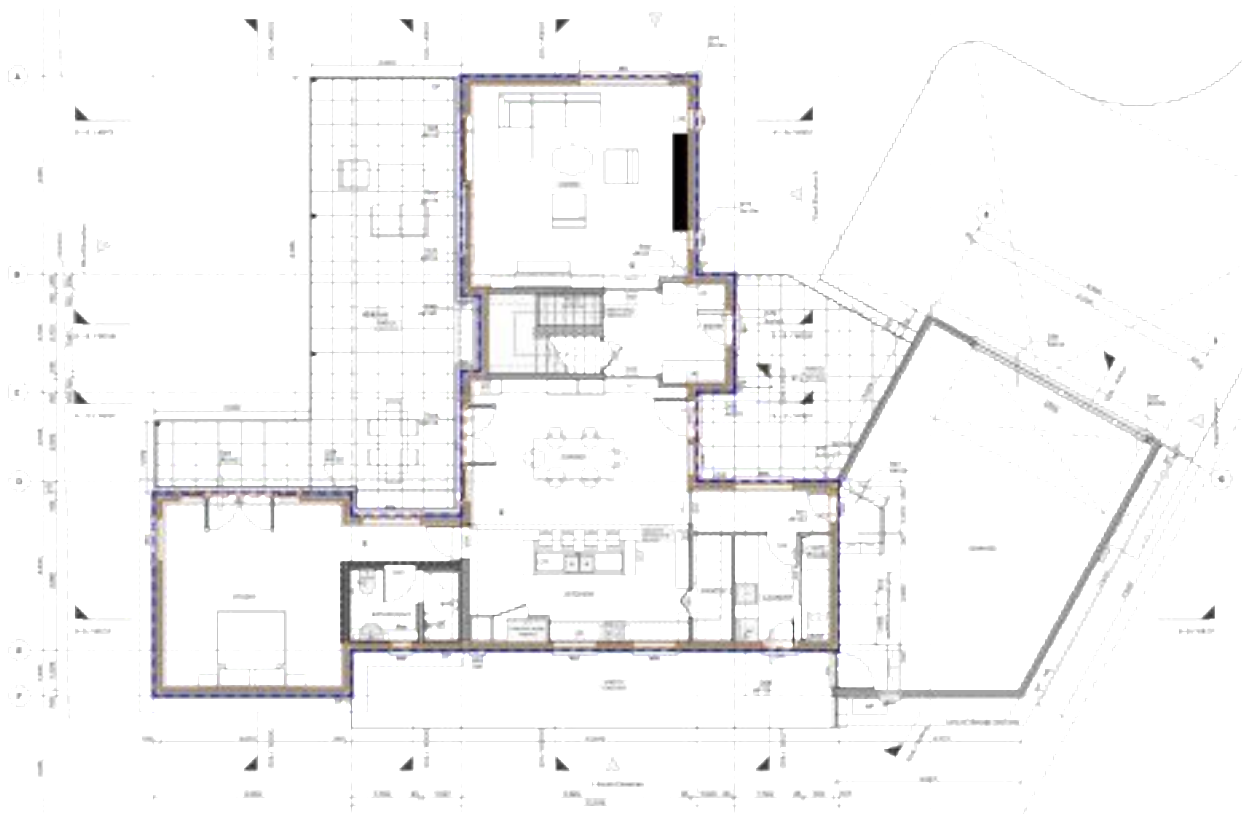


Section 1



Section D

4. Floor plans - Grundrisse

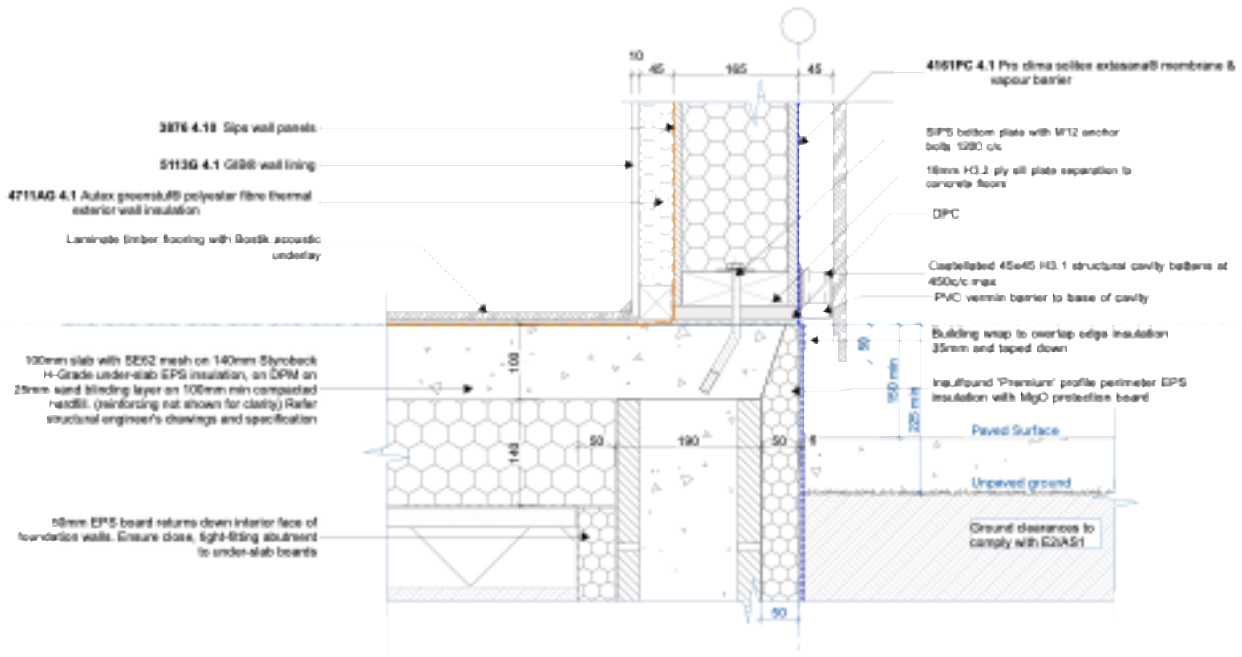


Ground Floor Plan



First Floor Plan

5. Floor slab/ basement ceiling construction including insulation Konstruktion der Bodenplatte

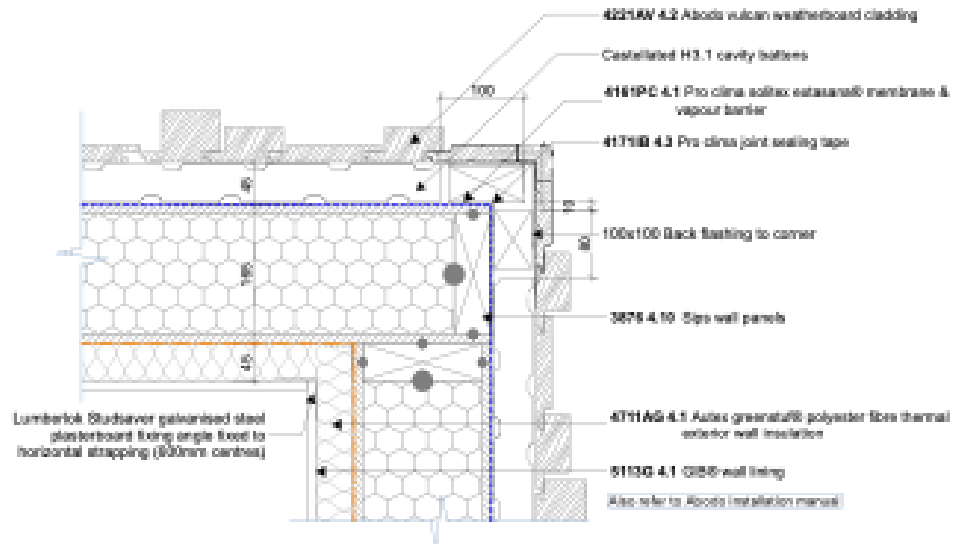


Floor Slab/Perimeter Wall Detail

The floor slab comprised of 100mm reinforced concrete raft slab laid over 140mm of continuous H-Grade EPS insulation. A 10mm thick timber laminate flooring finish was laid over an acoustic rubber underlay.

| | | | | | | |
|---------------------------------|-------------------------------|---|------------|---------------------------|------------|-------------------------------------|
| Assembly no. | Building assembly description | | | | | Interior insulation? |
| 01ud | FP - Typical Slab | | | | | <input checked="" type="checkbox"/> |
| Orientation of building element | | Heat transmission resistance [m ² K/W] | | | | |
| Adjacent to | | interior R _{si} | | exterior R _{se} | | |
| 3-Floor | | 0.13 | | 0.00 | | |
| 2-Ground | | | | | | |
| Area section 1 | λ [W/(mK)] | Area section 2 (optional) | λ [W/(mK)] | Area section 3 (optional) | λ [W/(mK)] | Thickness [mm] |
| TimberLaminateFlooring | 0.180 | | | | | 10 |
| BostikAcousticRubber | 0.144 | | | | | 5 |
| Concrete (reinforced)_PHPP | 2.100 | | | | | 100 |
| EPSStyrobeck Polyboard-H-Grade | 0.036 | | | | | 140 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| Percentage of sec. 1 | | Percentage of sec. 2 | | Percentage of sec. 3 | | Total |
| 100% | | | | | | 25.5 cm |
| U-value supplement | | U-value: 0.241 W/(m ² K) | | | | |

6. Wall construction including insulation - Konstruktion der Außenwände

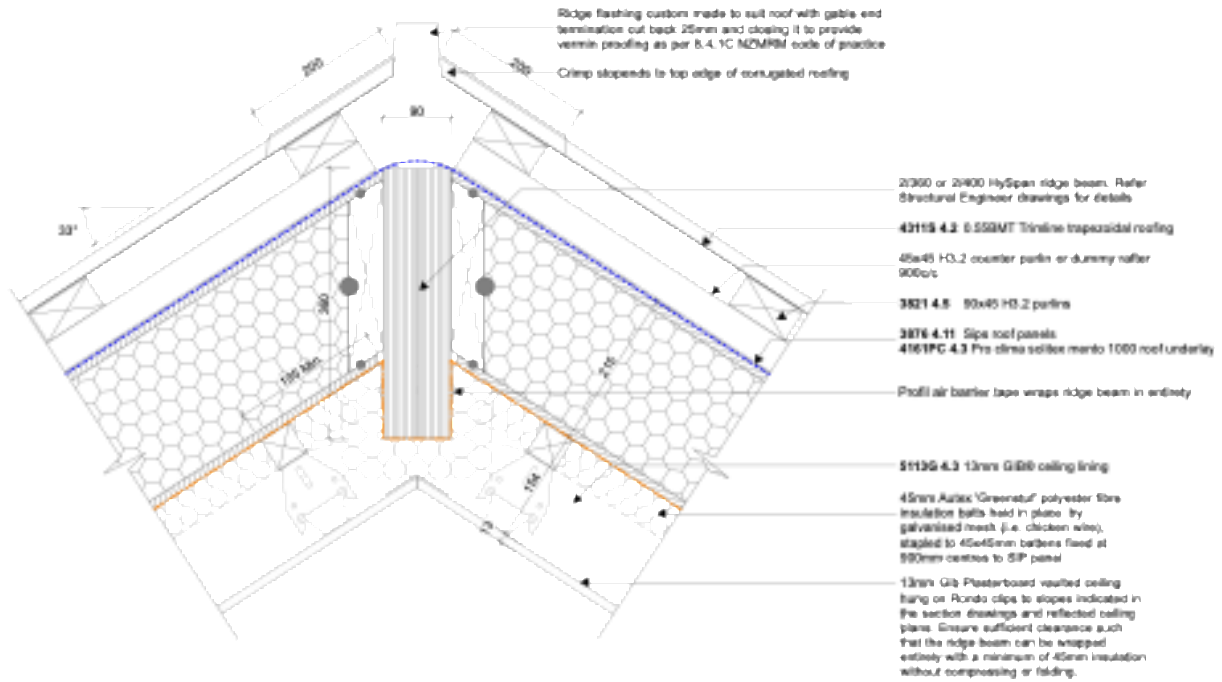


Exterior Walls - 165mm Formance SIPS with 45mm Greenstuff Polyester Fibre internally

All exterior walls were formed with a 165mm Formance Structurally Insulated Panel System (SIPS) comprising a 143mm EPS core sandwiched between two 11mm thick OSB sheets. An insulated service cavity was formed internally with 45x45mm horizontal timber strapping and Autex Greenstuff Polyester fibre insulation batts in all cavities. This service cavity was then lined with 10mm of Gypsum plasterboard.

| | | | | | | | | | |
|-------------------------------------|------------|---------------------------------------|------------|---|------------|----------------------------|--|----------------------|--|
| Assembly no. | | 02ud | | | | WALL-PB - Typical Wall | | Interior insulation? | |
| Orientation of building element | | 2-Wall | | Heat transmission resistance [m ² K/W] | | interior R _{si} | | 0.13 | |
| Adjacent to | | 3-Ventilated | | | | exterior R _{se} | | 0.13 | |
| Area section 1 | λ [W/(mK)] | Area section 2 (optional) | λ [W/(mK)] | Area section 3 (optional) | λ [W/(mK)] | Thickness [mm] | | | |
| Gypsum plasterboard_PHPP | 0.250 | | | | | 10 | | | |
| PolyfibreAutexMasonryWallIR1.3@45mm | 0.035 | | | Radiata Pine Battens at 600 centres | 0.130 | 45 | | | |
| ARB | | | | | | | | | |
| Oriented Strand Board (OSB)_PHPP | 0.130 | | | | | 11 | | | |
| EPSFormanceEPSFoamCore20kg/m3 | 0.038 | Radiata Pine Splines as Formance DWGs | 0.130 | | | 143 | | | |
| Oriented Strand Board (OSB)_PHPP | 0.130 | | | | | 11 | | | |
| WRB | | | | | | | | | |
| Ventilated Cavity | | | | | | | | | |
| Percentage of sec. 1 | | Percentage of sec. 2 | | Percentage of sec. 3 | | Total | | | |
| 86% | | 6.3% | | 7.5% | | 22.0 cm | | | |
| U-value supplement | | | | U-value: | | 0.201 W/(m ² K) | | | |

7. Roof construction including insulation - Konstruktion des Daches



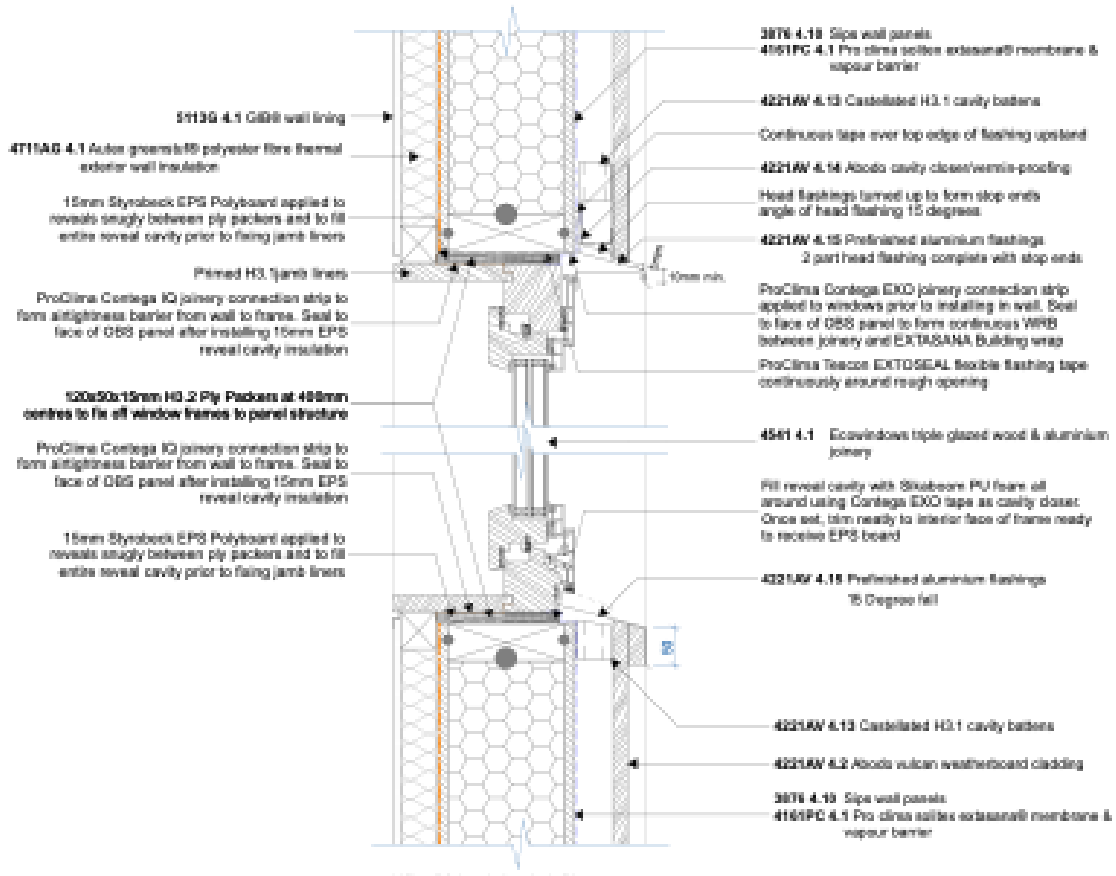
Roof Detail - 215mm Formance SIPS with 45mm Greenstuff Polyester Fibre Batts internally

Roofs were constructed with 215mm Formance SIPS comprising a 193mm EPS core sandwiched between two 11mm thick OSB sheets. An insulated service cavity was formed internally with 45x45mm horizontal timber strapping and Autex Greenstuff Polyester fibre insulation batts in all cavities. The insulation was held in place in some locations with 13mm Gypsum plasterboard and, in other locations where the ceiling is suspended below the SIPS, a wire mesh.

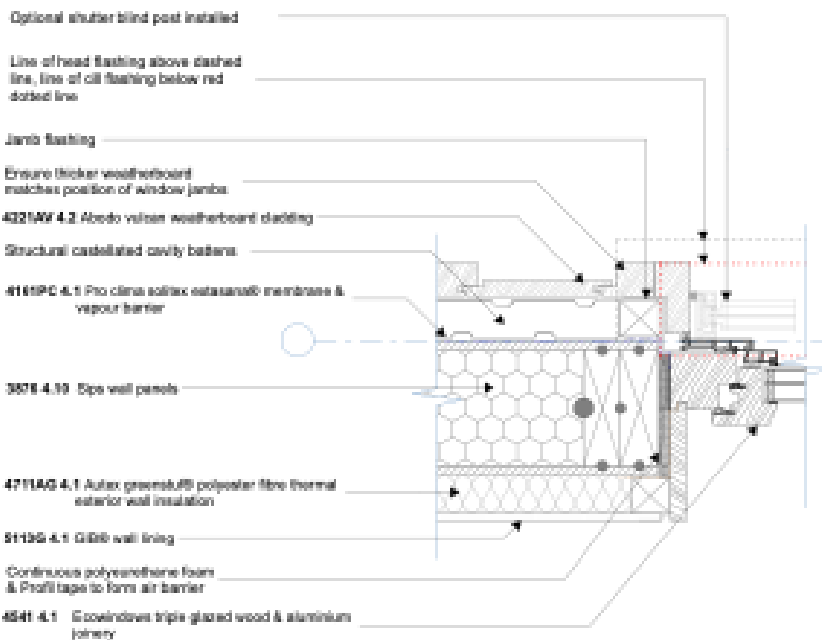
| | | | | | | | | | |
|-------------------------------------|------------|---------------------------------------|------------|---|------------|----------------------------|--|----------------------|--|
| Assembly no. | | 04ud | | | | ROOF - Unlined | | Interior insulation? | |
| Orientation of building element | | 1-Roof | | Heat transmission resistance [m ² K/W] | | interior R _{si} | | 0.13 | |
| Adjacent to | | 3-Ventilated | | | | exterior R _{se} | | 0.13 | |
| Area section 1 | λ [W/(mK)] | Area section 2 (optional) | λ [W/(mK)] | Area section 3 (optional) | λ [W/(mK)] | Thickness [mm] | | | |
| Ceilings/Roof void | | | | | | | | | |
| PolyfibreAutexMasonryWa IIR1.3@45mm | 0.035 | | | Radiata Pine Battens at 600 centres | 0.130 | 45 | | | |
| ARB | | | | | | | | | |
| Oriented Strand Board (OSB)_PHPP | 0.130 | | | | | 11 | | | |
| EPSFormanceEPSFoamCore20kg/m3 | 0.038 | Radiata Pine Splines as Formance DWGs | 0.130 | | | 193 | | | |
| Oriented Strand Board (OSB)_PHPP | 0.130 | | | | | 11 | | | |
| WRB | | | | | | | | | |
| Ventilated Cavity | | | | | | | | | |
| Percentage of sec. 1 | | Percentage of sec. 2 | | Percentage of sec. 3 | | Total | | | |
| 86% | | 6.9% | | 7.5% | | 26.0 cm | | | |
| U-value supplement | | W/(m ² K) | | U-value: | | 0.165 W/(m ² K) | | | |

8. Window and window installation including glass Ug / g-value and frame performance - Fenster und Fenster-Einbau

Windows: EcoWindows Wood-Alu ST68 (Spruce), U_f (average) – 1.37 W/(m²K)
 Triple glazing (typical): U_g 0.65 W/(m²K), g-value 0.54



Window Head and Sill Details



Window Jamb Detail

9. Air leakage testing - Beschreibung der luftdichten Hülle

The home's air control layer was formed by the concrete floor slab and the Formance Wall and Roof Structurally Insulated Panels interior OSB sheets. All SIPS joints were fully taped with Pro Clima Tescon Vana. All window joinery was taped to the SIPS with Pro Clima Contega IQ joinery strips.

The air control layers is represented by the orange dashed line in all above drawing extracts. Final result: 0.39 ach n₅₀

Pressurisation Graph:

Envelope Leakage Test

Testing Company:

Name:
Address:

Technician:

Name: Murray Durbin
Credentials: Enveloped Solutions Ltd
Email: murray@enveloped.solutions

Building Information:

Project ID: [REDACTED] Milton Rd, Mt Eden, Auckland
Address: [REDACTED] Milton Rd
Mt Eden
Geo-Tag Data: Latitude:
Longitude:
Timestamp:

Customer Information:

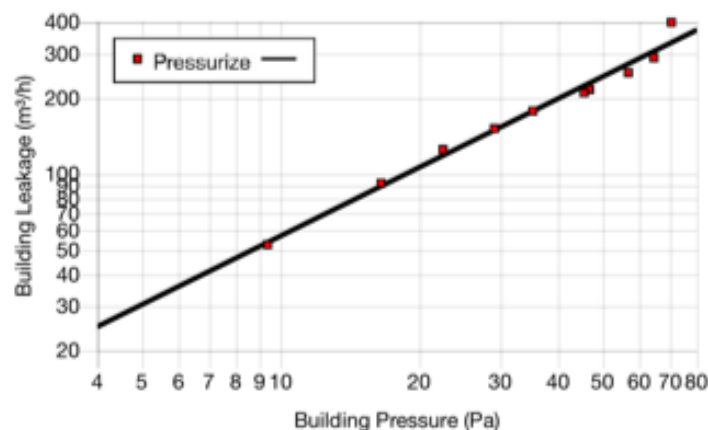
Name: [REDACTED]
Address: [REDACTED] Milton Rd
Mt Eden

Measured Leakage: 0.39 n₅₀ (1/h)

Leakage Target: 0.60 n₅₀ (1/h)

Compliance with Leakage Target: Pass

| | | |
|--|---------------------------|---|
| Test ID: | 19 April Pressure (3) | |
| Purpose of Test: | ISO Multi-Pt Env. Leakage | |
| Internal Volume: | 631.3 m ³ | Flow@50(m ³ /h): 243.4 (+/- 7.2%) |
| Envelope Area: | 0.0 m ² | Flow@50(m ³ /h)/m ² (Env. Area): 0.00 |
| Net Floor Area: | 0.0 m ² | Flow@50(m ³ /h)/m ² (Flr. Area): 0.00 |
| Coefficient of Det. (r ²): | 0.98208 | Exponent (n): 0.903 (+/- 0.100) |
| Air Leakage Coefficient (C _L): | 7.1 (+/- 35.6%) | Air Flow Coefficient (C _{env}): 7.1 |
| Test Standard: | ISO 9972 Multi-Point | Test Mode: Pressurize |
| Environmental Data: | Indoor Temp: 21 °C | Outdoor Temp: 21 °C |
| | Bar. Pressure: 101,325 Pa | Time Average Period: 30 seconds |
| Test Date and Time: | 2022-04-19 13:12:23 | |



Envelope Leakage Test

Testing Company:

Name:
Address:

Technician:

Name: Murray Durbin
 Credentials: Enveloped Solutions Ltd
 Email: murray@enveloped.solutions

Building Information:

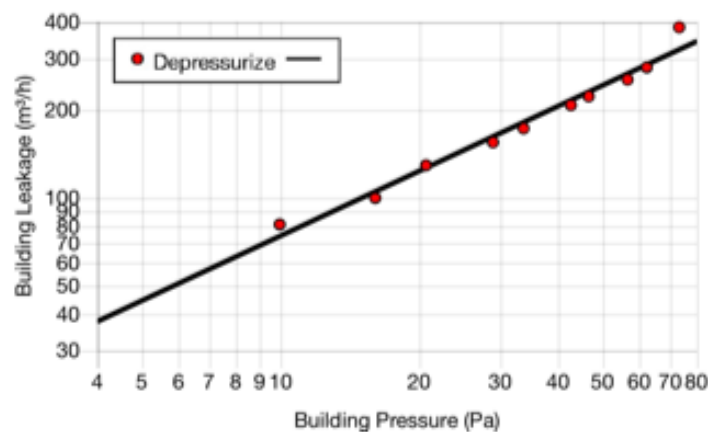
Project ID: [Redacted] Milton Rd, Mt Eden, Auckland
 Address: [Redacted] Milton Rd
 Mt Eden
 Geo-Tag Data: Latitude:
 Longitude:
 Timestamp:

Customer Information:

Name: [Redacted]
 Address: [Redacted] Milton Rd
 Mt Eden

Measured Leakage: 0.38 n₅₀ (1/h)
Leakage Target: 0.60 n₅₀ (1/h)
Compliance with Leakage Target: Pass

| | | |
|--|---------------------------|---|
| Test ID: | 19 April (2) | |
| Purpose of Test: | ISO Multi-Pt Env. Leakage | |
| Internal Volume: | 631.3 m ³ | Flow@50(m ³ /h): 243.0 (+/- 7.1%) |
| Envelope Area: | 0.0 m ² | Flow@50(m ³ /h)/m ² (Env. Area): 0.00 |
| Net Floor Area: | 0.0 m ² | Flow@50(m ³ /h)/m ² (Flr. Area): 0.00 |
| Coefficient of Det. (r ²): | 0.97482 | Exponent (n): 0.738 (+/- 0.097) |
| Air Leakage Coefficient (C _L): | 13.6 (+/- 34.4%) | Air Flow Coefficient (C _{env}): 13.6 |
| Test Standard: | ISO 9972 Multi-Point | Test Mode: Depressurize |
| Environmental Data: | Indoor Temp: 21 °C | Outdoor Temp: 21 °C |
| | Bar. Pressure: 101,325 Pa | Time Average Period: 10 seconds |
| Test Date and Time: | 2022-04-19 12:53:38 | |



10. MVHR - Lüftungsgerät

The dwelling's MVHR system is a Wolf CWL-2-400, operating at an effective heat recovery efficiency of 87% and a specific electrical efficiency of 0.20 Wh/m³. This is reduced to an overall efficiency of 82% once the direct-extract kitchen rangehood is taken in to account.

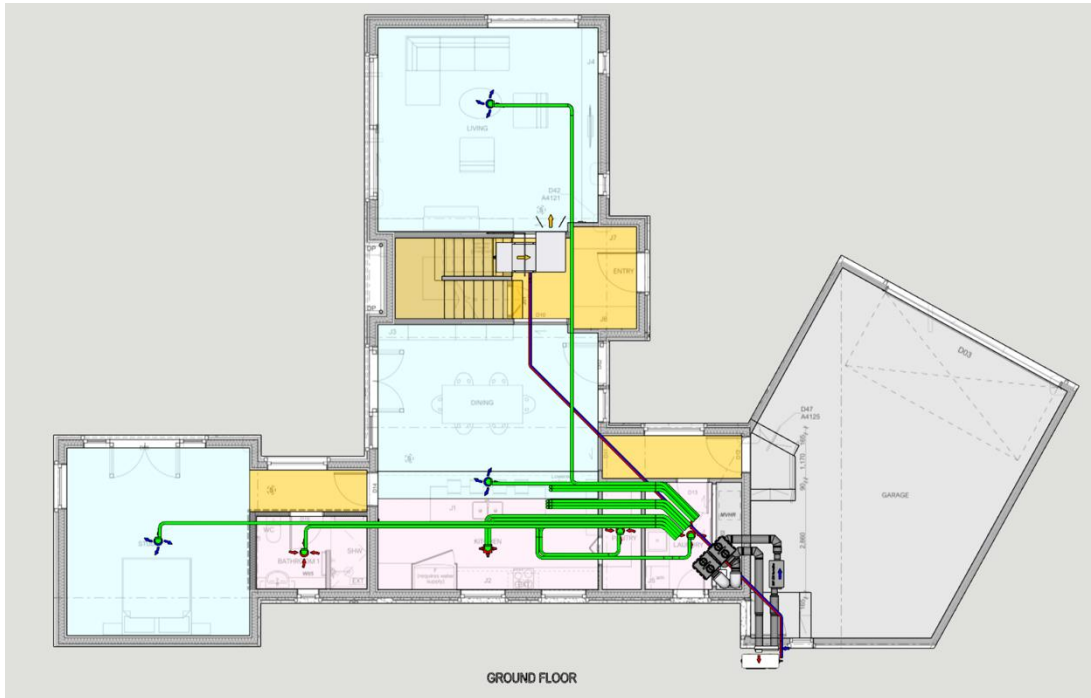


An additional dehumidifier, located outside of the thermal envelope in the garage ceiling space and in-line with the MVHR supply air, manages interior relative humidity to a higher level of control at the client's request.

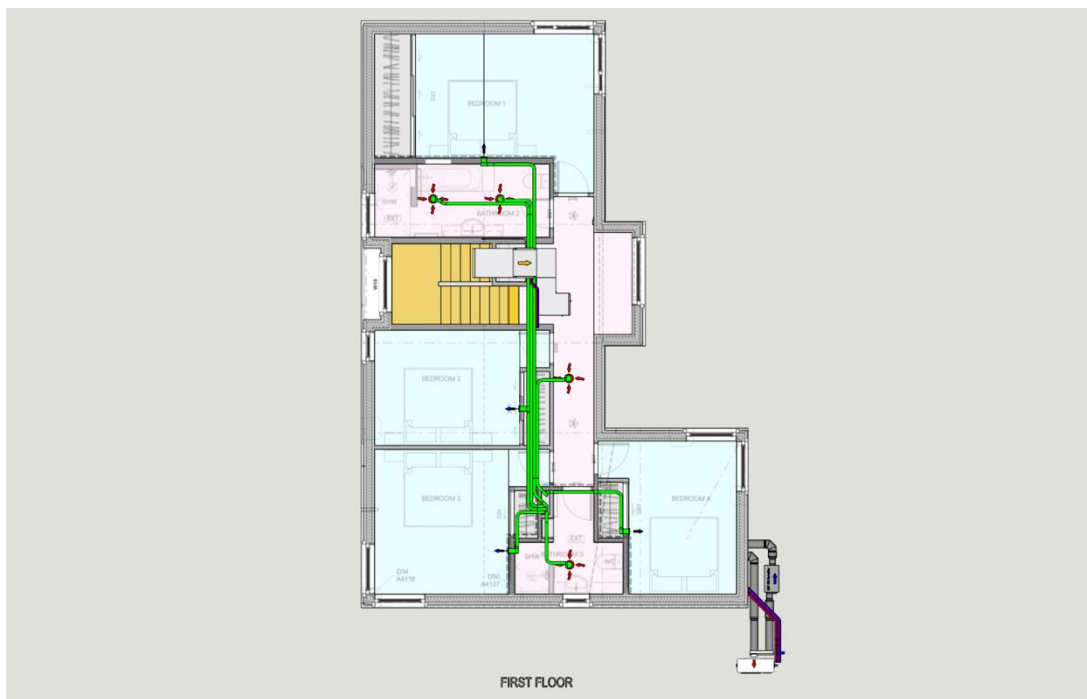


11. Ventilation ductwork - Lüftungsplanung Kanalnetz

Wolf MVHR ductwork layout (drawings by Edge Innovation Ltd.).



Ground Floor



First Floor

13. Building costs - Baukosten

Not supplied.

14. Publications featuring the building - Literatur

[Context Architects Ltd Case Study – Milton Road Passive House](#)
[Sustainable Engineering Case Study – Milton Road Passivhaus](#)

15. PHPP-Ergebnisse

| Specific building characteristics with reference to the treated floor area | | Criteria | Alternative criteria | Fulfilled? ² |
|--|--|----------|----------------------|-------------------------|
| Space heating | Treated floor area m ² | 214.0 | | |
| | Heating demand kWh/(m ² a) | 14.0 | 15 | yes |
| | Heating load W/m ² | 9.8 | - | 10 |
| Space cooling | Cooling & dehum. demand kWh/(m ² a) | 2.4 | 15 | yes |
| | Cooling load W/m ² | 5.0 | - | 10 |
| | Frequency of overheating (> 25 °C) % | - | - | - |
| | Frequency of excessively high humidity (> 12 g/kg) % | 0 | 10 | yes |
| Airtightness | Pressurization test result n ₅₀ 1/h | 0.4 | 0.6 | yes |
| Non-renewable Primary Energy (PE) | PE demand kWh/(m ² a) | 107 | - | - |
| Primary Energy Renewable (PER) | PER demand kWh/(m ² a) | 68 | 60 | 68 |
| | Generation of renewable energy (in relation to projected building footprint area) kWh/(m ² a) | 38 | - | 11 |

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.

Task: **2.Certifier** First name: **Jason** Surname: **Quinn** City: **Wellington**

Certificate ID: **37811_SENZ_PH_20230130_JEQ** Issued on: **30/01/23**

Passive House Classic? **yes** Signature: 